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TRANSACTIONS

OF THE

Twenty-sixth Annual Meeting

OF THE

AMERICAN LARYNGOLOGICAL ASSOCIATION

HELD AT

ATLANTIC CITY, N. J.

June 2nd, 3rd and 4th, 1904

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TRANSACTIONS OF THE TWENTY-SIXTH ANNUAL MEETING OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION.

HELD AT ATLANTIC CITY, N. J.

JUNE 2, 3, AND 4, 1904.

THE PRESIDENT'S ADDRESS.

BY J. H. HARTMAN, M.D.

Fellows of the American Laryngological Association: It is my pleasure and privilege to welcome you here to this City by the Sea, upon our Twenty-sixth Annual Congress, and at the same time express to you my appreciation of the great honor which you have conferred upon me as your presiding officer.

It is a significant fact, that twenty-seven years ago to-morrow this Association first saw its beginning. On June 3, 1878, a small number of those engaged in the practice of what might be said was then in its infancy—Laryngology—gathered together in the City of Buffalo, and launched forth most advisedly and thoroughly fitted for the object intended, your Association. How well it has served its purpose, you have but to look back upon the record of the work accomplished during this period to be convinced that it was not a wasted effort.

I congratulate you, Gentlemen, that since our last coming together the ranks of our Association have remained unbroken. It has seldom happened that we have not had to mourn at our gatherings over the passing to the "Great Unknown" of some one of our cherished Fellows, but thanks to Father Time for dealing so gently with us the past year.

The continued advancement of the special department in medicine which our Association represents, whilst not particularly

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marked during the past year, is sufficiently flattering to cause us to feel the great interest and seeking out of new fields which prevails, offering as much encouragement and hope for the future as the brilliant success which has marked the past. I have but to refer to the question of the management of Malignant Disease of the Larynx, which has absorbed the active interest of so many of our able co-workers, not with the hope of finding some active therapeutic agent, as much as the relief to be obtained by well proven surgical methods. We are fortunate in having on our programme the promise of a full and complete review of this subject by one of our Fellows, thoroughly familiar with the same —Dr. Delavan.

The investigations and treatment of Hay Fever by Prof. W. P. Dunbar are not without interest. The introduction of an Antitoxin for the treatment of such cases has called forth expressions sufficiently encouraging to hope that we may look forward to be able at least to ameliorate, if not cure, this very troublesome malady.

Direct examination of the Esophagus and Bronchi by Killian's Method has opened a new field. That we are to have this subject fully dwelt upon by one of your most learned Fellows is a source of great gratification.

Gersuny's Method of the subcutaneous injection of paraffin for the correction of nasal deformities is rapidly becoming a well-established fact, with improved suggestions for carrying out the same, diminishing greatly the dangers following the procedure which beset the operation in the beginning.

The treatment of disease of the accessory sinuses has reached such a stage that I might well say it has a field of surgery quite to itself, and without which the treatment of such cases would end in the disappointment which so often followed a few years back.

It is given to this Association to have the honor of carrying upon its rolls a member who has been familiar with the value of the laryngoscope for nearly fifty years. I refer to our one and only Honorary Fellow, Señor Manuel Garcia, to whom belongs the credit of the discovery of the practical application of the laryngoscope in 1854. Garcia was not only the *first* person who performed Auto-laryngoscopy, but also the first to employ a laryngeal mirror in an extensive manner physiologically, and the

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first to carry out a series of experiments on a large scale in relation to the singing voice.

Señor Garcia entered upon his hundredth year on March 17th last. I would suggest that this Association send a message during this Congress to our Honorary Fellow full of good wishes on this auspicious event.

The question of enlarging the number of our membership will come before you for consideration at this Congress. Our present allotted roll being now complete, I should judge that such a step could be well taken at this time. We must bear in mind that many of us are slowly but surely reaching a period when our active usefulness cannot possibly be as it has been in the past. Further, there are many able workers whose fellowship will redound to the credit of the Association, and who should be associated with us, being restrained from such an affiliation by the restriction of membership which at present prevails.

The holding of our Congress this year away from some usual large centre is a radical departure, but no doubt a wise one. Greater opportunity is given for carrying out more fully the intentions of our gathering, and I cannot but feel that a few days of intercourse amidst such surroundings will add greatly in every respect to the object we all have in view.

The improved financial condition of your Association the past year, resulting chiefly from the increase of dues—a well-taken step—relieved your Treasurer greatly and enabled the Secretary to publish the last Volume of Transactions much earlier than any previous year; the volume being in the hands of the Fellows the first part of October, a strong argument in favor of the Association being its own publisher.

And now, Gentlemen, before bringing these few remarks to a close, let me again express to you the honor I feel on this occasion and beg of you your indulgence and assistance in carrying out the work before us.

I now declare the Twenty-sixth Annual Congress of this Association open and ready for business in accordance with the admirable programme before us.

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NASAL HYDRORRHEA.

BY JOHN EDWIN RHODES, M.D.

A CONSIDERABLE literature on this affection has collected since Bosworth, in 1889, called the attention of the profession to it, in a thorough discussion of the subject, in which he gave abstracts of the sixteen cases he then found on record. Little has been added to our knowledge since that time, although a number of theories as to its etiology have been offered by different writers.

It seems desirable to establish the distinct entity of cerebro-spinal rhinorrhea. The character of the fluid, alone, would be sufficient to determine such an entity, and to distinguish it from true nasal hydrorrhea. The laboratory tests, as outlined by St. Clair Thomson, are sufficient to determine whether the fluid is cerebro-spinal:

1. Cerebro-spinal fluid is transparent, like water, and has no sediment.

2. It is faintly alkaline, and it may be either tasteless or slightly salty.

3. The specific gravity is 1005 to 1010.

4. Is not viscous and gives no precipitate (mucin) on addition of acetic acid.

5. On boiling there is no more than a trace of coagulum of serum globulin or serum albumen.

6. Cold nitric acid gives a precipitate, which disappears on heating and separates on cooling.

7. Saturation with magnesium sulphate should give a precipitate; saturation with sodium chloride should give a precipitate, and ammonium sulphate should be tried if the above fail.

8. The liquid should give a pink, or red rose color, on addition of copper sulphate and excess of caustic potash.

9. It should reduce Fehling's solution.

10. The reducing substances can be separated out by evaporating to dryness an alcoholic extract of the fluid. It is then found as needle-like crystals.

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11. An aqueous solution of the residue does not ferment with yeast.

It is generally conceded that this fluid comes from the sub-arachnoid space and finds its exit through the nasal cavities. Possibly it finds its way by filtering down through peri-neural sheaths, or through traumatic openings in the skull, the results of blows, injuries, etc.

Hektoen records a case in which a portion of a meningocele was removed from the nose and cerebral fluid escaped therefrom.

It differs from true nasal hydrorrhea in some of the symptoms, particularly headache, which usually ceases when the discharge is free, and the other symptoms that might be referred to brain pressure seem to result from the cessation of the nasal flow.

For these reasons the two affections should no longer be classified together, but should be considered as quite distinct in character.

Nasal hydrorrhea is a copious flow of watery fluid from the nasal mucous membrane, either continuing through the entire 24 hours or appearing at certain times during the day, or at irregular intervals, and persisting sometimes for long periods of time, possibly unaffected by any treatment whatsoever. It may come from both nares, but is often one-sided.

The etiology of the disease has been the subject of much discussion, and there have been various theories advanced.

Its neurotic character is generally accepted. The two theories that have received the widest recognition are:

1. It is a neurosis of the tri-facial nerve, in the nasal mucosa.

2. It is one of the symptoms of a general neurasthenic condition.

Bosworth believes that there are two classes of cases, in one of which there is an ablation of function of the tri-facial nerve, followed by a serous exosmosis, which takes place without sensation. In a second class of cases there is an intense irritation of the nasal mucous membrane. Here the integrity of the tri-facial nerve is intact, and there seems to be some disturbance in the sympathetic system to account for the phenomena. This latter class of cases, he thinks, is closely allied to hay fever, being dependent, largely, upon the neurotic habit, so-called, but differing from hay fever in the absence of a diseased condition of the Schneiderian membrane and the recognized influence of pollen

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upon it. He summarizes his theories, tersely, as follows: "In connection with an intensely neurotic temperament the nasal mucous membrane is rendered sensitive to some obscure atmospheric condition, under the action of which vaso-motor control of the blood-vessels, whose specific function is the exosmosis of serum in the normal process of respiration, becomes paralyzed, and then exosmosis takes place to an abnormally large extent."

Kyle, in his study on the subject, contends that in most, if not all cases, the hydrorrhea is a local manifestation of a constitutional condition in which the venous return is impeded, producing a cyanotic condition of the nasal mucous membrane, followed by leakage of serum into the perivascular spaces, edema, hydropic degeneration of the epithelial cells, etc.

Nikitin considers it a reflex paresis of the vaso-motor nerves of the nasal mucosa, reflex in character, as might be caused by the presence of adenoids, etc., and illustrative of the theory, gives a history of such a case in a girl of eleven years of age, in whom the hydrorrhea followed the removal of lymphoid tissue in the pharyngeal vault, and which was cured after five months' treatment.

Cathcart reports a case, however, in a girl of nine, in which operation for adenoids twice, and cauterization of the nasal cavities, failed to give the slightest relief.

Lawrence had a case, following an attack of edema of renal origin, the flow existing for several years, finally becoming constant, in which many forms of local treatment were without avail.

Angieras narrates a case following an operation on the sinus maxillaris for empyema, and in which the nares were normal. He thought the condition parotidean in origin.

Molinie cites a unique case in which the development came after an attack of ordinary "Grippe," in which the grayish secretion changed to a blue color four or five times during the day. This could not be accounted for. Bacterial examination was negative. It was not hysterical and the color was not introduced from without.

Natier maintains that nasal hydrorrhea is invariably dependent upon a state of general neurasthenia and is exclusively a symptom of that affection, and, in support of his theory, reports 14 cases with a neurasthenic history. He considers that nasal

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polypi and other intranasal pathologic conditions are the effects and not the causes of hydrorrhea, thus accepting an assertion previously made by other observers. He believes the frontal sinus plays an important part in the formation of the liquid, thus accounting for the frontal headaches, which some others consider simply plethoric in origin. He also believes that cerebro-spinal rhinorrhea could be proven to be neurasthenic. The hydrorrhea caused by hay fever, he thinks entirely distinct, being a special vaso-motor rhinitis.

Mayer reports 5 cases, in 4 of which just preceding the menopause, the nasal hydrorrhea was much augmented during the menstrual period. These cases were all cured.

In this connection, a case reported by Laguerriere, last year, is interesting. A woman, 30 years of age, was being treated for pelvic trouble, by means of electricity, and thus was relieved of an obstinate and profuse nasal hydrorrhea.

Lichtwitz had a case, in a woman, associated with various nervous phenomena, which was improved by puncture of the right sinus frontalis, and a year later cure followed the expulsion, from the nasal cavity, of a gelatinous mass.

Lermoyez thinks that the disease is much more frequent than his American confreres have believed it to be, and that it is a common ailment among the sufferers from arthritic conditions, of which it is merely an accidental symptom, often alternating with other phenomena of that state, as gout, rheumatism, migraine, etc. Nasal lesions are not constant and are possibly secondary. He further asserts that the fluid is not an exosmosis, but a true secretion dependent upon abnormal excitation of the trigeminal nerve, and cites as proof that muscarin intoxication produces nasal hydrorrhea. He asserts that there may be vaso-dilator activity, but not paralytic phenomena. Pathogenically, the relation between the nasal hydrorrhea and the general systemic condition and its relation to local or nasal lesions, should be carefully studied.

One of the most critical of recent investigators, St. Clair Thomson, in his excellent paper on the subject, in 1898, has limited the term, "Nasal Hydrorrhea" to those cases in which no visible pathological changes are found in the nares, and in which the fluid flows from the mucous membrane, without any apparent cause of irritation in the nose or neighboring parts, and in which

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the amount of secretion is considerable. He furthermore takes as a standard of the character of the secretion Prof. Halliburton's analysis in his case. This showed:

Water	98.792	Per 100.
Total solids	1.208	
Proteids, including the mucin	0.260	
Other organic substances	0.163	
Inorganic substances	0.785	

He adds that the presence of mucin, the absence of reducing substances, as well as the percentage of proteids and solids differentiate it from cerebro-spinal fluid. He insists that we should eliminate from consideration in our study of true nasal hydrorrhea cerebro-spinal rhinorrhea; those cases dependent upon pathological intra-nasal lesions; those caused by sinus disease or by general nervous affections; and those in which there is not a copious flow, it being simply a symptom of such conditions as hay fever, vaso-motor rhinitis, etc.

These are the main theories advanced by investigators. To me it seems that the neurasthenic character of the disease is fairly well established, and probably the exosmosis of the fluid is due to the irritations of the terminal filiments, in the nasal mucosa, of the tri-facial nerve. The exciting cause is not well established, and is probably due, in many cases, as suggested by many authors, to some obscure atmospheric condition.

The main symptom is the discharge of a clear, limpid fluid from the nose, which examination should determine was not a true nasal secretion or a cerebro-spinal fluid. It may be from both nostrils, but often from one only, the quantity varying widely in different cases, from a rather free discharge to a pint or more in 24 hours. The flow may come drop by drop, without intermission in the 24 hours, or be somewhat periodical in character, possibly ceasing for a time, but, in many cases, recurring.

There are other symptoms, as headaches, insomnia, cough, sneezing, nervous phenomena, etc., which are by no means constant, but in many cases the discharge is practically the only pronounced symptom of which the patient complains. The nose, on examination, may appear perfectly normal. Kyle noticed a boggy appearance of the mucous membrane of the nasal cavities

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during the attack, in his case, and there was evidence of a passive congestion and local irritation.

In the treatment some results have been shown by a few, while many report the trial of numerous remedies with little or no influence on the course of the disease.

Linhart's case was cured by the use of Dobell's solution, with a dram of suprarenal extract to the ounce, used as a spray. Similar satisfactory results from suprarenal extract are recorded by Phillips and Berens, the latter using the remedy both locally and internally. Natier recommends a general treatment for the neurasthenic condition, believing local remedies of little avail. Mahu reports a case cured by the use of hot air. Baber used the constant current of electricity and a 20-per-cent. solution of menthol as spray and reports his case cured after a few months of treatment.

Lermoyez seems to have observed a larger number of cases than anyone else, 42 in number. He deprecates any local treatment whatever. In 15 of his cases treated with the usual methods of endonasal manipulations, removal of polypi, etc., only two were cured. Of the remaining 27 cases, 13 were lost sight of, but he believes some of them were improved. Of the remaining 14 cases, 10 were cured by the use of strychnine and atropine, as follows:

Sulphate of strychnine..... 5 milligrams.
" " atropine ..... 5 "
Syrup of orange peel.....400 grammes.

Two drams of this mixture were taken at breakfast for 10 days; on the following 10 days, 2 doses; on the following 10 days, 3 doses; always at meal times. In this way he attacked the hypersecretion with the atropine, the vaso-dilatation with strychnine. He thinks this treatment should always be instituted at first and local treatment should be undertaken only when this has failed.

Other forms of treatment have been referred to by Bosworth and other authors, among the most important of which are electricity, cauterization, cocaine, quinine, etc.

Author's Case.—Mrs. G. M. F., aged 44, was brought to me by her physician, January 30th, 1904, complaining of a constant dripping of fluid from the right naris, which began December

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15th, and continued, without intermission, after that date, day and night. She had a similar attack, following a cold, 5 years before; one which lasted for 10 days and yielded to local treatment. She was of a decidedly nervous temperament, the condition being much aggravated, at this time, from the persistency of the discharge. Her heredity was good, and she had never had a severe illness. She was of robust appearance, and in every respect was in excellent physical health. She had been under considerable physical and nervous pressure previous to the attack, having nursed a relative through an attack of typhoid fever in October, and was ill in November, and in bed a week, from a streptococcus infection of the throat, which was thought to be diphtheritic at first. Three weeks later she went to St. Paul, to be with a friend whose husband was to undergo a severe operation. She was present at the operation, lasting one and three-quarter hours, and for two days and nights following was sympathetically consoling the hysterical wife. She became much exhausted physically and nervously. She returned to Chicago at once, and, on the way to the train, on a very cold day, was suddenly seized with a severe aching, burning and stinging sensation in the right side of the nose, accompanied with sneezing and the symptoms of an acute rhinitis. In three days the watery discharge began.

Status Præsens.—General health, good. Excellent appetite. Temperature, normal. Pulse, normal. She had no headache. The nasal discharge was painless and dripped from the right side, only, on an average of about four large drops a minute when the head was held forward. Her nights were much disturbed, for the secretion continued while she slept, soaking her pillow, and on change of position running into the pharynx and causing choking sensation when it reached the larynx. There was no excoriation of the lip. During the day she wore a napkin about the nose, and constant use of handkerchief was necessary. The fluid did not stiffen the handkerchief. The nasal cavities were free. They were normal in every respect, save possibly an excessive moisture of the right side, but no site of the discharge of the fluid could be found, and the mucous membrane had no swollen or sodden appearance. The throat was also normal. The fluid was examined at the Columbus Laboratory. It was clear, limpid, tasteless, but became clouded on standing; specific gravity, 1012; alkaline, sugar absent, albumen absent, cells absent, mucin absent. It was declared purely a serous exudate. A quantity was collected for an hour during the day, and it was found that 12 ounces were discharged in 24 hours. The patient stated that this was somewhat increased when she was very nervous.

Treatment.—She was given a pill of zinc phosphide, nux vomica and quinine, with benefit to her nervous condition, and bro-

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midia to quiet the restlessness at night. She had already had treatment at the hands of other physicians by electricity, bromides, belladonna and varied local applications without benefit. I used, at first, 5 per cent. protargol, then 50 per cent. arygrol, to the nares, and gave her a spray of adrenals 1-5000 and Dobell's solution to use at home. I tried, in succession, cocaine, adrenalin, cauterization, zinc salts, strong application of menthol in abolene, and internally belladonna, aconitine, etc., without the slightest benefit. Finally I used a solution of argentum nitrate in a small quantity, 60 grains to the ounce, and over a portion only of the nasal cavity. This caused some pain and a little headache, but immediately following there was a cessation of the dripping for a few moments. On February 20th I swabbed the nasal cavity first with 1-1000 suprarenalin solution thoroughly, and applied the 60-grain solution of nitrate of silver to the entire accessible parts of the nasal cavity. The pain was severe and she went home and to bed with a violent headache caused by the treatment. On February 25th the headache ceased, the discharge began to decrease rapidly, and in three or four days ceased entirely and has not returned.

In this case, it seems to me, we have a true nasal hydrorrhea. The character of the fluid differentiates it from cerebro-spinal rhinorrhea, and headache was not present. Thomson gives as among the evidences of the discharge being cerebro-spinal that it is usually one-sided, continues during the whole 24 hours, does not stiffen the handkerchief, and the nose presents no pathological changes. Notwithstanding these conditions, in my case, the inception of the disease, with intense nasal irritation, with the general nervous symptoms and absence of any symptomatic evidence of the fluid coming from without the nasal cavity, I am satisfied that there was first a marked irritation of the terminal fibres of the vaso-motor nerves in the nasal mucosa, followed by paresis, and an exosmosis of fluid through such loss of nervous control.

Bibliography.

Bosworth. Diseases of Chest, Throat and Nose. Vol. I., p. 258, 1889.

Kyle. Journal American Medical Association. XXVI., p. 697, 1896.

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The cases reported up to 1896 will be found in the two references above.

Lichtwitz, L. Prager Medicinische Wochenschrift, Prague. XVIII., pp. 71, 82, 94, 1893.

Jankelvitch. Revue Hebd. de Laryngologie. XVII., p. 1505, 1897.

Holinger, J. Chicago Medical Recorder. XIV., pp. 433-35, 1895.

Coolidge, A. Boston Medical and Surgical Journal. CXXXLX., p. 490, 1898.

Molinie, J. Journal American Medical Association. XXXVI., p. 1818.

Chappell, W. F. New York Medical Journal. IX., p. 403.

Thomson, St. Clair. Trans. Medico-Chirurgical Society, London, 1898. LXXXII. British Medical Journal, 1898. II., p. 1247. British Medical Journal. II., p. 793, 1899.

Nikitin, W. Monatschrift für Ohrenheilkunde, Berlin. XXXII., p. 553, 1898.

Molinie, J. Revue Hebd. de Laryngologie, Paris. XVIII., pp. 1308-12, 1898.

Baber, C. Journal Laryngology, Rhinology and Otology. March, 1898.

Melzi, W. Journal Laryngology, Rhinology and Otology. XIV., p. 63, 1899.

Lermoyez. Presse Médicale, May, 1899. No. 41, p. 203. Annales des Maladies de l'Oreille, etc., Paris, July, 1899. Abstracted in Journal Laryngology, Rhinology and Otology, August, 1900.

Brown, J. H. Medicine. VI., p. 993, 1900.

Freudenthal, W. New York Medical Journal, March 31, 1900.

Linhart, C. P. Annals of Otology, Rhinology and Laryngology, August, 1900.

Berens, B. Annals of Otology, Rhinology and Laryngology, August, 1900.

Williams and Stocker. British Medical Journal. II., p. 1042 1901.

Angieras. Revue Hebd. de Laryngologie, Paris, June 29, p. 753, 1901.

Natier, Marcel. Abstract New Orleans Medical and Surgical Journal, August, p. 110, 1901.

Mahu, G. Annales des Maladies de l'Oreille, du Larynx, etc., No. 6, June, p. 481, 1902.

Lawrence, L. A. Transactions London Laryngological Society, January 10, 1902. Also Journal Laryngology, Rhinology and Otology, April, p. 198, 1902.

Cathcart, G. C. Transaction London Laryngological So-

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ciety, March 7, 1902. Also Journal Laryngology, Rhinology and Otology, May, p. 255, 1902.

Larkin, F. C. Liverpool, Medico-Chirurgical Journal, October, 1902.

Laguierriere, A. Le Progrès Médicale, January 10, 1903.

Garaizabel, I. Revisita Centro Med. de Cordoba. Argentina. II., 6-7.

Jankelevitch. Revue Internat. de Rhin., Otol. et Laryngol., Paris. IX., pp. 5-13, 1898.

Discussion.

DR. H. L. SWAIN considered this paper a delightful commentary on the work of Dr. Goodale in his laboratory and histological investigations. He thought it should be deduced from Dr. Goodale's paper that local remedies were of no use whatever, the condition not being due to pathological changes, but to a vasomotor condition not controlling the blood-vessels. Dr. Rhodes had brought out the point that in his experience a great many local remedies were of no use. Dr. Swain felt, however, in commenting upon the result in Dr. Rhodes' case, that it was the profound systemic disturbance which produced the cure, and that the same result might have been reached by the use of electricity or any other method, provided it was radically employed.

BRONCHOLITHIASIS, WITH REPORT OF A CASE.

BY D. BRADEN KYLE, M.D.

TO BE thought worthy of more than passing interest, custom seems to have decreed that a pathologic condition must belong to one of two extremes; either it must occur with alarming frequency, or else be extremely rare.

While broncholithiasis belongs to the latter class if we are to judge by the number of cases reported, the condition has been observed by many clinicians and is briefly referred to in a few text books, yet the opinions regarding the etiology and pathology of the condition are conflicting and inconclusive, and in none of the few cases that I find recorded was the diagnosis of broncholith made till the concretion was expectorated; in fact, these calcareous formations are sometimes found post-mortem, never having caused any symptoms during the life of the patient. On the

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other hand, however, the majority of cases have shown symptoms, which, prior to the expectoration of the stone, were attributed to tuberculous infection, asthma, etc.; most common among these are pains of an indefinite type and varying in intensity from a feeling of uneasiness or pressure about the chest to a distinct soreness in a certain spot and pains, even sharp and lancinating in character may be felt during forcible inspiration and paroxysms of coughing. Some have described the pain as most severe at the expulsion of the stone. Cough may occur only at long intervals and come on in paroxysms or it may continue more or less regular, simulating an ordinary chronic bronchitis. Dyspnea is present in some cases, particularly during attacks, asthmatic in character, though in others entirely absent. Hemoptysis, while rare, occurs in some cases and may lead to an erroneous diagnosis of tuberculosis.

And yet after all the one pathognomic symptom and the only one on which a positive diagnosis can be made is the expulsion of one or more stones. The greater number of cases reported expectorated a single stone, though Poulalion, who has carried out probably more extensive observations on the subject than anyone else, reports the case of a man who coughed up about one hundred.

In regard to the origin of these concretions many theories are advanced. In Nothnagel's *Practice of Medicine* we find this statement: "Parts of the bronchi themselves, of the lungs, or of the pleuræ, may calcify and after being cast off, get into the bronchi; even mucus, after lying some time in a cavity, may be changed into a calcareous stone." Osler mentions broncholiths only under chronic ulcerative phthisis, and says: "Fibroid changes gradually produce a sclerosis of the affected area within which may be a uniform, firm, cheesy substance in which lime salts are often deposited. It is only when complete calcification has occurred that we can really speak of healing. Subsequently, in ulcerative processes these calcareous bodies may be expectorated."

Hektoen-Riesman (*Amer. Text-Book of Pathology*) observe: "Bronchial calculi occasionally occur from the calcareous infiltration of retained material—inspissated inflammatory deposits, etc. —and from incrustation of accidentally inspired foreign bodies. The latter variety is rare, however, because the foreign bodies generally cause purulent inflammation."

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In Stengel's Pathology we find this reference: "Bronchial concretions sometimes form by inspissation of the secretion, especially in bronchiectatic cavities. Very rarely cartillaginous or bony masses derived by outgrowth and later separation from the bronchial cartilages are observed."

While broncholiths have likely been observed most frequently in tuberculous subjects, they do occur in the non-tuberculous, who, after the expulsion of the stones usually become entirely well and free from any pulmonary or bronchial irritation.

Mager (Wien. klin. Woch., March 17th, 1898) records the case of a woman, 28, who had had pneumonia in early childhood. Shortly after the time reported she had paroxysmal attacks of coughing, and often expectorated lung stones, which varied in size from 0.5 to 1 cm., and were composed of calcium and magnesium phosphate, with a little calcium carbonate and organic matter. He suggested that the case seemed to be one of primary broncholithiasis, since it was preceded by no recent disease excepting slight bronchitis, and the patient did not live or work in a dusty atmosphere. The case was similar to the one which I shall here report.

The patient, a woman, aged 38 years, with negative family history, had been in perfect health until about five years ago, when there developed a hacking cough, with which there was associated a sensitive spot in the left side of the chest in the second intercostal space slightly to the left of the parasternal line. The cough gradually increased, and while at times the paroxysms would come on with great severity, during which the pain became lancinating in character, causing the patient to press her hands to her chest over the sore spot, yet at other times it would almost subside, though she was never *free* from a slight cough and soreness. Only indistinct, dry râles were heard. Dyspnea was not marked except during the hard fits of coughing, and no blood was expectorated at any time.

She had been under the care of several physicians, and had taken medicine almost continually. I, myself, when she came under my care about a year ago, employed various remedial agents and changed the reaction of the secretions, but all measures were followed by the same futile results, except when powerful sedatives were used, and even these succeeded only in decreasing for a time the more aggravated symptoms.

The sputum, always scanty, was examined on several occasions for tubercle bacilli, with negative results.

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Thus the symptoms continued without any absolute intermission till one day, in February of this year, in a violent paroxysm of coughing, a hard, irregularly formed, oblong body, about .5 by .8 cm. in size, and of bony appearance, was expelled. The surface was uneven, with four small crests and one deep excavation. The analysis showed its composition to be calcium and magnesium phosphate, with a small quantity of calcium carbonate and organic matter, which are the most usual elements found in bronchial concretions.

After the expulsion of the stone the patient began immediately to improve, the soreness in the chest rapidly subsided, the cough ceased, and to-day she is perfectly well.

SUB-GLOTTIC TUBERCULAR LESIONS OF THE LARYNX.

BY

THOMAS AMORY DE BLOIS, M.D.

It has always been a question for argument as to whether tuberculosis is ever primary in the larynx,—and, any instances which throw even a feeble light on this subject seem to be worthy of being reported.

There have been, of course, numerous cases of apparent primary tubercular lesions of the parenchyma of the larynx, where the absence of physical signs in the lungs and the constitutional disturbance would seem to indicate that the larynx was the point of first infection,—but these two cases which I report were already well advanced in lung disease before the sub-glottic space became involved. Besides this, tubercular bacilli were found in the sputum on the first examination. I have never known tubercular bacilli to be found where there were *no* physical signs.

In sections of a tubercular larynx, even where there is deep ulceration, demonstration of the presence of bacilli is far from easy. My cases were both from the Boston City Hospital.

Case I.—My first case was a young Irish lad, McHugh W., and his history and appearance are best stated in the words of the

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Medical Department, to which he was referred. His age was twenty-three (23), and he was a butler by occupation. As to his family history, his father and mother are alive and in good health; four brothers and three sisters are in the same healthy condition. One brother died of diphtheria, and two others of some unknown cause in infancy. The patient had measles when a child. Pneumonia at eleven (11) years; also an abscess in the throat. He never had venereal nor rheumatic disease and does not use alcohol nor tobacco. He has had a cough since July, 1903. The sputum is yellow; there is persistent cough. He had sore throat for three (3) weeks. The dyspnea was so severe as to cause him to give up work. His appetite was fair. He has lost nineteen (19) pounds of weight. He weighs one hundred and sixteen and half (116½) pounds. His physical examination shows him to be poorly developed and poorly nourished. Heart is systolic at apex. Apex visible and palpable in fourth (4th) interspace inside nipple line. Right border in line with right border of sternum. The lungs show dullness in left apex, to second rib, to right apex. There were râles in both apices, and front and back, and in base of left lung (fine musical), occasional squeaky râles heard above spine of scapula on the right. Tubercle bacilli were present (February 26th). On laryngeal examination the larynx was observed to be somewhat hyperemic; the voice was not hoarse, the arytenoid cartilages were not much enlarged, the vocal cords were somewhat reddened, but the edges were sharp and smooth. Between the cords, and in

Case 1.—Sub-glottic tubercular ulceration of larynx.

the region of the anterior commissure, could be seen a round, red swelling, situated about an inch sub-glottic. This first examination was before the physical examination was made, and was about the middle of February. I believed this to be a sub-glottic abscess, and so entered it on the records.

Two days after this the supposed abscess had either ruptured or broken down, and presented the appearance of a slightly raised circular swelling with a white ulcerated centre. The rest of the larynx did not show evidences of tuberculosis in a marked degree. Suspecting the tubercular origin of the lesion the patient

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was sent to the Medical Department, and the before mentioned report was received. A specimen of sputum was furnished to the Pathological Department, and a report of the presence of tubercle bacilli was returned. Under constant local applications of lactic acid, together with the use, internally, of "creosotal," the sub-glottic ulcer slowly healed, the patient gained weight, and as the laryngeal condition did not interfere with deglutition, there then seemed no reason why this patient should not secure an arrest of the tuberculous process in the larynx. From the advancing disease in the lungs, this patient went down rapidly, although the throat complications did not return.

CASE II.—My second case came to the City Hospital clinic within a few days after my first, and so much did the conditions of the second larynx resemble the first that I might have mistaken the two patients; except that the second was a Swede and the first an Irishman. Karl H. was aged twenty-four years, and was born in Sweden, was an upholsterer by trade. A little over three months ago was hoarse and came to see what the matter was. The vocal cords and arytenoids were somewhat swollen, and slightly reddened. Below the anterior commissure, exactly in

Case II.—Sub-glottic tubercular ulceration of larynx.

the same position as the first case, was a similar open ulcer. The patient was sent to the Medical Department for physical examination, and the following report returned: Karl H., age twenty-four; Swede; upholsterer; father and mother are living and well; two sisters and four brothers are living and well; there is no lung trouble in the family. He has always been well; the first time he ever went to a doctor was to the Throat Department for this hoarseness. About three years ago he had gonorrhea which was cured in three weeks. He uses no tobacco nor alcohol; once in a while uses a little snuff. Bowels are regular; he sleeps well; his appetite is good. Two months ago he began to feel lazy, and not so strong. He commenced to be slightly hoarse nine weeks ago, and this brought him to the hospital a short time ago. He expectorates about a tablespoonful morning and night; the color is green and white and thick. He coughs mornings and evenings,

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and sometimes during the day. He sweats very little, if any, and sleeps well at night. No pain in throat at any time; no pain anywhere. He does not feel so strong now. He thinks he has lost seven and one-half pounds in past one and one-half years. Now weight one hundred and thirty-five. Does not know what his best weight was. His color is good, tongue coated, slightly cyanotic. Heart negative, save for soft systolic at pulmonary area. Lungs: Dulness with moist râles at right apex. Abdomen and legs negative. This case retrograded very rapidly. By the time I made my sketch the ulceration had crept upwards and involved the edges of the cords. Aphonia came on, deglutition became difficult, and death came a little quicker than in the first case, where the larynx did not become ulcerated. It is rarely that ulceration *below* the vocal cords is seen primarily.

A BRANCHIAL CLEFT CYST SIMULATING A CHRONIC RETRO-PHARYNGEAL ABSCESS.

BY C. G. COAKLEY, M.D.

MRS. M. B. B., aged 27, was referred to me on March 12, 1904, by Dr. George D. Stewart.

The history, from the inception of the disease up to the time I saw this patient, is best given in the words of Dr. E. Reid Russell, of Charlotte, North Carolina, who treated the patient for some months and to whom I am greatly indebted for the following history:

Mrs. B. first consulted me on August 1, 1901. She complained of bad colds for the preceding six or eight years, especially pronounced during the winter months. As she expressed it, "the head seemed filled up with mucus; any change of temperature seemed to accentuate the unpleasant sensation; the ears seemed to have a stopped feeling, which opened on swallowing." This feeling of fullness about the head was relieved mornings on the expectoration of a large ball of mucus. Objectively, the right and left nares appeared to be perfectly free, but the inferior turbinates seemed boggy and inflamed. The post-nasal space was, at this time, filled with a muco-purulent secretion. The tonsils were enlarged and diseased. Under protracted local treatment the muco-purulent discharge was cleared from the post-nasal space, the turbinates became normal in appearance and the tonsils were reduced in size.

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It was not until April 12, 1903, that I was again called to see Mrs. B. at her home. She was confined to her bed by the birth of a child on March 22. At that time, the patient complained of a very sore throat and chilly sensations, beginning on the ninth day following her parturition. The left tonsil was found to be inflamed, the crypts exuding a cheesy material, and, on the introduction of the finger in the post-nasal space I detected fluctuation. This was opened with a septum knife, evacuating, at least, two drams of very offensive pus. This gave the patient great relief. (At no subsequent evacuation of the pus was there any odor to the secretion.) A few days later, thinking that I had a retropharyngeal abscess of tonsillar origin to deal with, I injected hydrogen peroxide into the cavity. This gave rise to very acute suffering and the peroxide was not again repeated. I employed alkaline applications and argyrol. The diagnosis was retropharyngeal abscess of tonsillar origin. I kept the cavity open for eighteen days, at the expiration of which time I considered it healed and allowed the cavity to close entirely.

On July 4, 1903, the patient again called at my office. I found that the abscess had returned and I followed again practically the same treatment as outlined above. This time, however, I made the opening a little lower down. I resolved to keep it open, but, later on, decided that it was all right again, and allowed it to close a second time.

On July 12th, I removed the left tonsil. The patient seemed to improve very much, and, a little later, went to the mountains of this State. While there she had a recurrence of the trouble. and returned home on September 12th for me to attend to it. She complained of the same chilly sensations and other symptoms as in the past. I opened the cavity and followed practically my former treatment. I now realized—what I had previously suspected—that I had a serious problem to handle, and, I am free to admit that I was very much perplexed and at my wit's end. I suggested to the patient that it would be well for her to consult a higher authority, but, on account of the age of the baby, it was not convenient for her to go to your city at this time. She did, however, return to her former home in Georgia, in the hope that freedom from household cares might strengthen her. It was, however, the same story. The abscess returned and was opened there, the treatment being practically the same as that that I had been pursuing.

It was on January 12, 1904, that I next saw Mrs. B. Conditions were practically identical with those in the past. This time, however, the pain was very acute and the patient suffered a great deal more than on any previous occasion. I kept the cavity open at this time for twenty-five days. Some five or six weeks later, when the cavity again filled, the patient was sent to your city for advice and treatment. During all these twelve months the patient

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was kept on various general tonics and alteratives. In all, the cavity was opened and packed seven times.

On my examination I found a well-nourished patient. The mucous membrane of the nose was slightly congested. On looking into the oro-pharynx, a bulging mass, the color of which did not differ very materially from that of the surrounding mucous membrane, occupied the visible portion below the left side of the soft palate, behind the posterior pillar of the fauces, extending downwards as far as the level of the upper border of the epiglottis and projecting inwards as far as the median line.

On attempting to get a view of the naso-pharynx, it was found that the mass extended upwards to the vault of the pharynx, along the left lateral wall, and, while the right choana with its structures was visible, the septum and left choana were entirely obliterated by the projection of the mass. Near the centre of the rounded prominence—as seen in the oro-pharynx—was a minute opening, at the mouth of which was a slight particle of thick, yellowish secretion. A probe passed into this opening penetrated to the depth of about ½ inch, going in an upward direction and nearly parallel with the surface. A drop of the same thick, yellow secretion was forced out during the act of probing. There was no curtailment in any of the movements of the head, as flexion, extension and rotation. A slight fullness could be felt in the neck, below the left ear and behind the angle of the jaw, when compared with the same region on the right side. Manipulation was not painful. No enlarged glands could be detected in the neck on either side. The pharynx was cocainized, first by spraying with 4-per-cent. solution of cocaine and, subsequently, by the injection of a 1-per-cent. solution of cocaine in several places beneath the mucous membrane, over the mass, in the pharynx. The mass had every appearance of being a retro-pharyngeal abscess, situated slightly more laterally than medially. A curved bistoury was introduced into the fistula and the cavity slit up its entire length. Practically, no secretion was found, all having been evacuated in the act of probing. With a pair of punch forceps I removed much of the thickened mass from the left lateral wall. It was found to consist of very densely organized connective tissue. When this was removed from an area ¾ of an inch wide and 1½ inches long, to a depth of more than ½ inch, the bulk of

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the pharyngeal projection had disappeared. On introducing my finger I found that I had still to do with a fluctuating mass on the lateral wall of the pharynx, behind the posterior wall of the fauces. Being somewhat afraid of wounding the great vessels of the neck, I plunged a steel probe through the tissues in the direction of the fluctuating mass and quickly entered a large cavity, from which there escaped 1½ ounces of thin, very foul-smelling, greenish-yellow, turbid fluid. As soon as this had been evacuated the patient exclaimed: "You have opened into the abscess, and it is the first time that it has been opened completely." The feeling of relief on the evacuation of this fluid was far different, she said, than any that had been given as the result of the previous incisions into the abscess. When the fluid was evacuated I introduced a pair of punch forceps through the opening made by the probe and removed the wall, so as to leave an opening the diameter of a ten-cent piece into the cavity. The interior of the cavity could be readily seen to be lined with a glistening, greyish membrane. I next inserted the forefinger of my right hand into the cavity for the purpose of exploring it, and found that I could pass my finger upwards to the base of the occipital bone, downwards—behind the tonsil—for a distance of nearly one inch, where the sack seemed to end; posteriorly, my finger could feel the transverse processes of the cervical vertebræ. The finger could not be extended so far backwards as to determine the posterior limit of the cavity. Externally, the finger in the cavity could be made to push out the tissues on the lateral wall of the neck, below the ear and behind the ramus of the inferior maxilla, the finger of the other hand—placed in opposition to it—found merely the layers of skin and fasciæ interposed, apparently, not more than ¼ of an inch in thickness.

My diagnosis, given at the time, was that of chronic retropharyngeal abscess, the result of the breaking down of a large, deep, cervical gland, and that, in all probability, it was tubercular. Dr. Stewart, who referred the case to me, was asked to come in and explore the cavity from his surgical standpoint, to determine whether there were any evidences of disease of the vertebræ that might account for the abscess. He was very positive that there was no disease of the vertebræ.

The cavity was packed with about 18 inches of iodoform gauze and the pieces of tissue removed by the first cuttings—as well as

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those from the wall of the cyst—were preserved and sent to the Carnegie laboratory for microscopical examination. In the meantime the cavity was repacked with iodoform gauze at intervals of about forty-eight hours. At no time was there more than a drop or two of mucoid secretion on the gauze or in the cavity. The gauze oftentimes came away without being any more moist than at the time of introduction. Unfortunately, the secretion that escaped was not saved for microscopical or bacteriological examination.

Not only from the feelings of the patient, but also from the statement of Dr. Russell—who had been treating the case for the past ten months—the earlier efforts to evacuate this cyst had merely evacuated a superficial abscess in the lateral wall of the pharynx, which had been produced by the rupture of the contents of the cyst into the connective tissue. The evacuation of this secondary abscess and the partial relief from the pressure in the cyst proper, afforded relief until reaccumulation and tension in the cyst caused a rupture again into the connective tissue of the pharynx and another abscess formation.

On March 16th the patient was seen by Dr. Jonathan Wright and Dr. Harmon Smith, who concurred in the diagnosis of retro-pharyngeal abscess of probable tubercular origin. A few days later the microscopical examination revealed the true nature of the pathological process to be a branchial cleft cyst. Dr. Edward K. Dunham, of the Carnegie Laboratory, has kindly furnished me with a detailed account of the microscopical examination as follows:

"Sections from the anterior or pharyngeal portion of the specimen show that this part is covered with stratified epithelium, immediately beneath which is fibrous, connective tissue, abundantly infiltrated with small, round cells of lymphoid character, some of which appear to be plasma cells. No polymorpho-nuclear leucocytes were found among these cells. The connective tissue contains numerous small blood-vessels and extends in the form of short, slender papillæ into the deeper layers of the epithelial covering. It is evident that this part of the specimen is, and has for some time been the site of sub-acute and chronic inflammation, for in some places this infiltrated tissue merges into a dense, cicatricial tissue, devoid of round cells.

"The inner wall of the cyst is lined with stratified epithelium,

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forming a layer about one-quarter as thick as that upon the pharyngeal surface. Beneath this is fibrous tissue—also the site of small, round cells—infiltrated in some places much more than in others. This relatively dense, fibrous tissue passes into an areolar variety in the deeper portions of the specimen, and, within this areolar tissue are numerous glandular acini, resembling the mucous portions of the normal salivary gland. The epithelium, lining these acini, has an alveolated or vacuolated structure, with nuclei close to the basal ends of the cells, and some of the acini contain cells like the crescents of Gianuzzi, found in salivary glands. These glands are provided with ducts lined with a low, columnar epithelium, and within the ducts the remains of the secretion—probably originally mucinous in character—may be seen.

"The accompanying microscopical photographs illustrate the appearances found. Figure 1 is from the pharyngeal part of the

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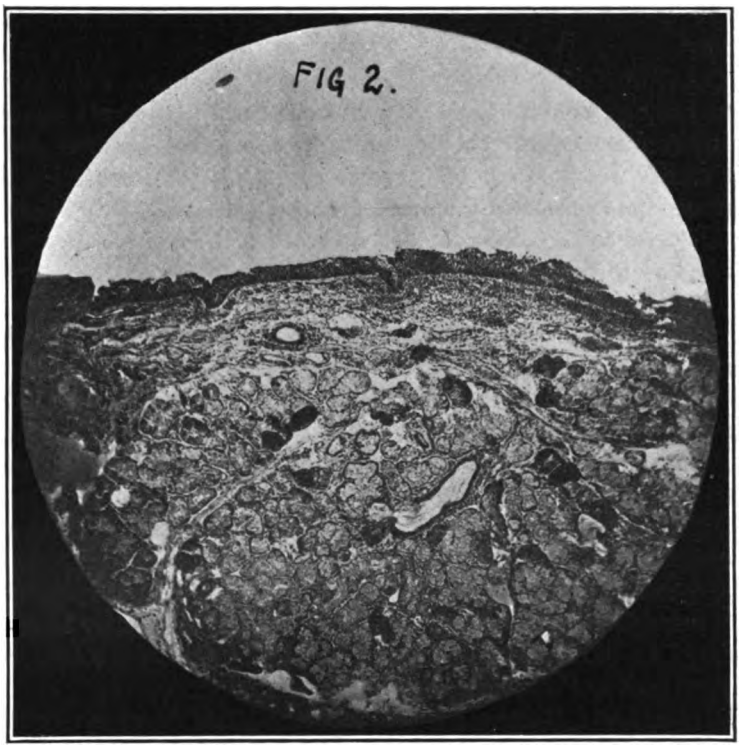

specimen. Owing to a fold or invagination the epithelial covering has been cut three times. The dense, infiltrated, fibrous tissue is seen immediately below the epithelium; no glands are present. Figure 2 is a section from the inner wall of the cyst. There is little, if any, round cell infiltration of the areolar tissue in and around the lobules of the gland."

On April 5th Dr. Robert F. Weir saw the patient in consultation with me. He concurred in the diagnosis of branchial cleft cyst. In reference to treatment, he felt that an operation—attempting to excise the cyst through an external incision—was unadvisable. The ramifications were, probably, so extensive, and the walls so intimately adherent to the great vessels of the neck, that there was little likelihood of complete extirpation. He recommended injecting the cyst—through the pharyngeal opening already made—with mild cauterants, such as solutions of nitrate

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of silver and carbolic acid, with the hope of thus obliterating the cavity.

On April 6th Dr. Robert C. Myles saw the case. He was at first inclined to consider it as a chronic retro-pharyngeal abscess of tubercular origin. He claimed to have seen two or three similar cases. He also advised against any operation having for its purpose the excision of the cyst. He found it exceedingly difficult in his cases to keep the cyst wall open when the incision had been made—as in this case—behind the posterior pillar of the fauces. He suggested allowing this opening to close and making an opening into the cavity by taking away all the inter-faucial wall of the pharynx for a width of ½ inch and a height of 1½ inches. In a similar cyst he found that this was the only method by which the opening could be kept patent. Food, however, got into the opening, causing annoyance. The prognosis for its cure, even by this method, he regarded as somewhat unfavorable.

The most careful search in literature, under the headings of "Branchial Cleft Cysts" and "Retro-Pharyngeal Abscesses," have failed to bring to light any case similar to this one. Among the many articles on Branchial Cleft Cysts, the following may be considered the most useful to one desiring to investigate the subject:

Kostanecki, *Virchow's Archiv*, Band 117.

Mielecki und Kostanecki, "Angeborene Kiemangangcysten des Menschen," *Virchow's Archiv*, Band 120 und 121.

Sutton on "Branchial Cysts, Diverticula, etc.," *Journal of Anatomy and Physiology*, London, 1886, Vol. 21.

Lannelongue, "Traite des Kystes Congeniteaux," Paris, 1886.

Senn, "Branchial Cysts of Neck," *Journal of the American Medical Association*, 1884.

From the position of this cyst there can be little doubt that its origin was from the second branchial cleft. Two explanations may be given for the late time in life at which the first appearance of this cyst was observed. First, that this cyst had, originally, a small, fistulous opening in the lateral wall of the pharynx, through which the accumulated contents readily found exit at stated periods. Later, through local inflammation in the pharynx, this fistulous opening became occluded, the secretion could find no exit until the cavity became sufficiently distended to rupture into the lateral wall of the pharynx. Judging from the history of the case and the large number of cysts opening into the pharynx,

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which are enumerated, this would seem the most probable explanation. Second, the cyst remained small until the secretion was excited into greater activity during the time of child-bearing and parturition, at which time its contents were under such tension as to rupture and invade the pharyngeal wall as above.

A CONTRIBUTION TO THE STUDY OF THE SECRETING MECHANISM OF THE NOSE.

BY J. L. GOODALE, M.D.

THE nasal mucous membrane has been an object of study from the beginning of microscopic research, and its secreting mechanism has received much attention from physiologists and histologists. Nevertheless, an examination of the literature of this subject, at the present day, presents a confusion of opinion with regard to certain important features, a confusion which is reflected in the text-books devoted to diseases of the upper respiratory passages. This has resulted in the employment of the great variety of empiric clinical procedures of transitory vogue which one may note in the history of laryngology.

Within a few years our knowledge of the phenomena of secretion in mucous membranes, has been considerably extended, and we are now in a better position to understand the source and nature of the fluid present on the surface of the nasal epithelium.

The object of the following paper is to review our present information concerning the subject in connection with additional personal investigations.

Among the writers whose names are connected with the early investigations of the subject may be mentioned Bowman, Schultze. R. Haidenhain, A. Haidenhain, Dogiel, Paulsen, Hoyer, and Suchanek.

It is not necessary to enter into historical details, and it is sufficient to say that at the present time two views are held with regard to the nature of the glands of the nose. We have on the one hand, the opinion of Stoehr and Paulsen, that these glands are of a mixed character, containing certain cells which secrete mucus, and others which secrete serous or albuminous fluid. Schieffer-

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decker believes, on the other hand, that these glands are genuine mucous glands for the following reasons: In the first place those glands which are filled with secretion have entirely the appearance of ordinary mucous glands in other situations. In the second place, glands are found which are almost completely filled with cells containing mucus. He is unable to find any point of distinction between those glands with mucus cells and those without, and he consequently is forced to assume that all cells of the glands are capable of producing mucus. Since his paper was published the beginning of the channels of the secretion has been studied by new methods, which have thrown much light upon the nature of glandular structures. Up to this time it had only been demonstrated that acini with protoplasmic cells occurred in association with those containing mucous cells. It was not yet certain whether a combination of glands occurred, containing mucous and serous cells, or whether the appearance denoted pure mucous glands, with glandular cells in different stages of function. Experience has shown, however, with regard to the glands of the mouth that it is extremely difficult to distinguish a mucous cell, empty of its secretion from a serous gland cell. On the other hand, the newer methods of Golgi have given very valuable results, since, with their help, a characteristic difference has been discovered between genuine mucous glands and serous glands. The latter possess secreting capillaries, the first do not.

Retzius and E. Mueller have shown that secreting capillaries are a certain proof for the presence of serous glands.

In such glands one sees, in addition to the central lumen, also delicate intercellular passages. These passages do not reach the membrana propria. In specimens stained by Haidenhain's hemotoxaline and iron, one sees the secreting capillaries are colorless tubules extending from the lumen between the gland cells. The secreting capillaries appear without walls of their own, but simply bounded by the upper surface of the cell bodies as tubules embedded in the cementing substance. Vacuoles are also found, but it is probable that they represent only transitory pictures in the cells, which appear when the secretion is present within the cell, but disappear when this is not the case.

In the mucous glands certain observers have also claimed to find secreting capillaries. If, however, one examines specimens stained by Golgi, and by other methods, he soon becomes con-

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vinced that the so-called secreting capillaries of the mucous glands are merely the walls of the mucous cells seen in profile and direct face view. These are blackish or brown in Golgi's pictures; markedly refractile and dark with specimens stained by hemotoxaline and congo red, and very sharply defined. The stained pictures show these boundaries more distinctly in proportion to the amount of mucus in the cells. In cells which have become protoplasmic the sharp contours disappear. In those which have become partially protoplasmic the sharp contours extend only as far as the mucous zones. This appears to contradict the assumption that we have to do with secreting capillaries in the mucous glands. If this were really the case, the cell boundaries of empty protoplasmic alveoli would be more distinct than in those filled with mucus.

In addition to this point we notice that wheareas the secreting capillaries of the serous alveoli show marked irregularities with regard to their length, their form, and particularly their breadth, the septa of the mucous cells show in all places where they are distinct, precisely the same appearance.

The mucous membrane of the larynx has been studied by Sophie Fuchs-Wolfring. She found in all the animals investigated certain things in common. Everywhere the glands of the larynx and of the trachea show two distinct types of acini.

One type consists of tall cells with a flattened nucleus resting on its base, staining more or less intensely with mucicarmine or Delafield's hemotoxaline. The boundaries of these cells are very distinct, and the lumina of the acini more or less widened, filled here and there with mucus. These are the characteristic mucous glands. In addition to these we find in the vicinity a large number of glands of totally different appearance. The alveoli are smaller, the cells are darker and without refractile surface, the margins of the cells are indistinct, the nuclei are round, with granular chromatin, the lumina very narrow. These glands, which resemble the albuminous glands, do not stain either with hematoxaline or mucicarmine. In all the specimens there were found more or less distinct secreting capillaries penetrating between the cells. These two forms are irregularly distributed. We see, in addition, more or less well-developed Gianuzzi's demilunes, and finally, the mucous and protoplasmic cells proper in the same acinus, in different degrees of predominance. With regard to

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the efferent ducts of these glands, we may say that near the orifice on the surface the ducts are covered with a tall, ciliated epithelium, which is replaced a greater or lesser distance by a flatter, cylindrical epithelium which becomes continually flatter, and finally cubical. It was not possible to determine positively whether serous glands occur independently with their own channels of exit, or whether these always open into the efferent ducts of the mucous glands and therefore represent lobules or mixed glands.

The glands of the larynx and trachea are therefore mixed glands, as demonstrated by the presence of secreting capillaries in the serous acini and their absence in the muciferous.

In all animals studied, it was possible to follow in these glands the different stages of function of the muciferous cells in one and the same acinus. All stages were encountered, ranging from the pure muciferous to the pure protoplasmic.

The serous acini discharge their secretion, for the greater part, into the mucous ducts. The specimens from the rabbit allow us to suspect, however, that in this animal serous glands have their own channels of exit.

In all the specimens studied there were found, in addition to independent serous, glandular alveoli, also Gianuzzi demilunes, of serous cells, in which likewise secreting capillaries were demonstrated.

In specimens of pilocarpinised animals all the glands present a picture of marked exhaustion. The glandular cells appear flattened and protoplasmic, the lumina wide. The mucous ducts in the cat and the secreting capillaries in the rabbit are enormously dilated. The connective tissue is penetrated by numerous lymph corpuscles.

From this presentation of the literature it will be seen that although both forms of glands have been demonstrated in the larynx of man, confusion still exists with regard to the nature of the glands of the nasal membrane of man, and we are still in the dark as to whether they are to be regarded as pure mucous glands, following Schiefferdecker, or as mixed glands, as stated by Stoehr. Before considering this question further, the following important point should be considered.

In addition to the glands of the mucous membrane, another arrangement contributes to the formation of nasal fluid. This is

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found in the canals which penetrate the basement membrane. These canals were first seen by Heiberg, who found them also in the larynx and trachea. Later they were found by Chattelier in hypertrophic nasal mucous membrane, but were not seen with certainty in normal tissues. Schiefferdecker has found them also in normal mucous membrane. According to this writer, they are readily recognizable under moderate enlargement, although smaller than the capillaries, and require no especial preparation, although they are naturally more distinct when the basement membrane is completely stained. The basement membrane is found only in the region of the ciliated epithelium.

These canals penetrate the basement membrane and end free under the epithelium. Usually they run obliquely, and at times present a continuation between the lower epithelial cells to a higher place, narrowing above to a point. The epithelial cells pass smoothly over the peripheral opening, and send nowhere a prolongation into it. Where the canaliculi lie close to each other, they are found separated by at least two to four epithelial cells. They are, however, distributed irregularly without especial reference to other structures. In the canals themselves, and also immediately above and below their openings, one finds frequently leucocytes which have wandered from the adenoid layer below, and have migrated into the epithelium. The prolongations of the connective tissue cells, which lie under the basement membrane, often penetrate into the canals, at times as far as the epithelium, and the darkly stained processes of the cells are readily recognizable in the canals. These canals are more readily recognized in hypertrophic nasal mucous membrane, and are here wider and are connected by transverse canals, so as to present, at times, a branching network. It is also easy to see here the relationship of these canals to the underlying connective tissue. In the latter, the adenoid layer is markedly developed, and one sees numerous thin strands of connective tissue rising obliquely towards the surface. These strands are separated by light spaces, which contain numerous leucocytes, and pass directly into the canaliculi. The rows of leucocytes extend likewise directly into these latter.

The above described light spaces in the adenoid layer are to be considered as markedly dilated channels, but whether in direct communication with the lymph spaces is uncertain. According

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to our previous knowledge it is not probable. The fluid contained in these channels may therefore have a different character from lymph. Probably we have here to do with a fluid containing but little albumen, inasmuch as after hardening in Zenker's solution or in alcohol one does not find evidence of coagulation in the spaces.

With regard to the significance of these basement canals it is in the first place unquestionable that they permit the passage of leucocytes through the epithelium to the surface.

Schiefferdecker believes that there is a continual passage outwardly of the fluid contained, and that the chief significance of this stream of fluid is to keep the surface of the ciliated epithelium moist. The fluid, therefore, on the surface of the mucous membrane, according to this view, must be composed of a mixture of glandular secretion, the secretion of the goblet cells and the fluid coming out through the basement canals. Schiefferdecker, at the time of these observations, however, was unable to find serous glands in the nose, and regarded all the glands as purely muciferous.

After reviewing the preceding literature, I determined to examine the uncut specimens of nasal tissues in my collection, and such others as were, from time to time, accessible to me, with the technique suggested by Retzius, Müller and Fuchs-Wolfring, for the study of laryngeal and tracheal glands.

The following questions were proposed for investigation:

1. What is the nature of the glands in the nose?

2. Is the aqueous vapor which the nose imparts to the inspired air derived from the glands or from the epithelial surface between the orifices of the gland ducts?

3. What histological alterations in the secreting mechanism are found in cases characterized clinically by changes in secretion?

I have, therefore, reviewed something over seventy specimens of nasal tissues which showed clinically slight or moderate deviations from the normal. It was considered desirable to leave out of consideration for the present cases which showed marked alteration, such as tumors and chronic infections. The technique employed in the examination consisted in the preparation of fresh tissues by Golgi's quick method, and in staining paraffine sections with the following stains: Hemotoxaline and Congo Red, as suggested by Retzius and E. Müller; Mallory's triple connective

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tissue stain, which affords beautiful pictures of mucous degeneration in addition to the fibrous elements; mucicarmine, as suggested by A. Mayer; muchematin, as suggested by A. Haidenhain. Many other stains were tested, but were found less satisfactory for the present purpose, such as Hoyer's thionin stain and several stains shown by Unna for the demonstration of mucine.

The cases studied may be best classified on the basis of their clinical appearances. The following conditions are comprised:

(1) Normal tissues removed in operations upon the septum.

(2) Chronic rhinitis showing intermittent congestion, and usually an excess of mucous discharge.

(3) Chronic rhinitis with tendency to hypertrophy, either simple, papillary or edematous.

(4) Chronic rhinitis with tendency to atrophy.

(5) Vaso-motor rhinitis.

I. NORMAL MUCOUS MEMBRANE.

Six cases were examined showing mucous membrane and underlying tissue removed from the septum in different portions of the region of the quadrangular cartilage. The specimens showed columnar ciliated epithelium, with a well-defined basement membrane, perforated everywhere by canaliculi, running more or less obliquely. Many of these canaliculi contain polynuclear, neutrophilis leucocytes, fixed in irregular positions, indicating amœboid movement. The basement membrane passes directly into a loose, connective tissue, the sub-mucosa of which exhibits irregularly outlined lymph spaces, containing small, round cells in varying numbers. These round cells have the character of lymphoid cells, plasma cells, mastzellen, with a smaller number of polynuclear leucocytes. The glands are situated usually below this lymphoid layer, and consist of aggregations of cells, the majority of which show mucous degeneration. In immediate association with these muciferous cells are others of a protoplasmic character. Close inspection of these protoplasmic or albuminous cells shows that a certain proportion are disposed to form acini, with narrow, linear, intercellular channels. In the examination of a given field, one finds these glands with capillaries, situated, as a rule, to one side of or below the muciferous cells. These

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capillaries at times show an irregular course, sometimes with vacuoles near their orifice. From what we know of the serous glands in the larynx and trachea, as previously described, we may conclude that we have here to do with essentially similar glands. We may, therefore, say the glands in this portion of the nose are chiefly mucous glands, showing various degrees of activity, as indicated by the degree of the development of the mucous degeneration in the gland cells, together with a smaller number of serous glands, which apparently form a separate division of the gland group. In the vicinity of these glands is a moderate, round-celled infiltration, consisting of lymphoid and plasma cells.

II. CHRONIC RHINITIS, CHARACTERIZED BY INTERMITTENT CONGESTION, AND USUALLY AN EXCESS OF MUCOUS DISCHARGE.

Ten cases were examined where portions of the soft tissues covering the lower or middle turbinate were removed. The mucous membrane shows in general epithelium of the columnar, ciliated type, which at times becomes cubical and occasionally squamous. There is a well-developed basement membrane, perforated by canaliculi, containing leucocytes, as already described, as in the case of the normal mucous membrane. Below this region the most conspicuous changes are seen to consist in an increased development of the venous sinuses, and usually of the glands. The changes in the glands consist chiefly in an increased size and number of the mucous elements. It was not possible to demonstrate an actual increase in the size or number of the serous glands, and if this existed it was, at least, not conspicuous. The mucous glands showed, as a rule, an increased activity in the mucous changes in the cells, so that in an examination of a given field the cells with mucous changes outnumbered those of protoplasmic character. There was also a varying increase in the amount of infiltration about the glands.

III. CHRONIC RHINITIS WITH TENDENCY TO HYPERTROPHY.

Five cases were examined of simple hypertrophy. By this term is denoted a condition clinically by an increased size of the middle or lower turbinate, with a smooth mucous membrane, moderately firm on pressure, of an opaque, reddish color, occurring, as a rule, in adults. (Fig. 1.) In these specimens the mucous membrane shows a somewhat thicker epithelium, with more

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Fig. 1.—Chronic rhinitis with moderate hypertrophy and considerable mucous discharge. The epithelium is columnar ciliated; with numerous interspaces; below which is a basement membrane, containing a moderate number of perforating canals, in some of which are leucocytes. The glands are increased in number and size. No difference can be seen between mucous and serous glands with this low power. X 125 diameters.

tendency to disappearance of the cilia, with more frequently cubical cells, though seldom of the squamous type. The basement membrane is well defined, and shows numerous canaliculi. Below this region the chief changes are seen to consist in an increased development of the fibrous tissue and, as a rule, of the glandular elements. The venous sinuses are not dilated in proportion.

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About one-third of the glands consist of a serous type, the remainder of the mucous form, with active and resting cells, in varying proportions.

In the papillary form of hypertrophy the essential changes consist in an irregular mammillation of the epithelium, due to an increased proliferation of the epithelial cells. The basement membrane is well defined, and shows numerous canaliculi. There is no especial difference noted in the glands from those occurring in simple hypertrophy.

Of edematous hypertrophy, twenty-four cases were examined. Under this heading are comprised various degrees of so-called polypoid degeneration and actual polyp formation. The mucous membrane is usually somewhat thinned, and consis's of cells ranging in type from columnar ciliated to squamous, the latter occurring, as a rule, in situations exposed to constant irritation, as the anterior aspect of polypi. The basement membrane is usually a slender, well-defined line, showing canaliculi in considerable numbers. Below this region there is an evident fibrous hypertrophy, accompanied by edema. The individual connective tissue fibers appear as delicate interlacing strands, separated by intervals of varying size, dependent upon the degree of the development of the edema. In this edematous are glands are seldom encountered. Where they occur they are usually found in the deeper portions. In these situations they show little or no tendency to increase in size or number. The mucous cells of the mucous glands are usually less frequent than in cases of hypertrophy without edema. The serous cells show no marked alterations in character.

IV. CHRONIC RHINITIS WITH TENDENCY TO ATROPHY.

Two cases of genuine atrophic rhinitis with ozena were examined, which showed characteristic changes in the mucous membrane. This appeared as a thick, compact layer of squamous epithelium, passing immediately to the rete mucosa, without intervening basement membrane. (Fig. 2.) There was little or no evidence of diapedesis of leucocytes through the epithelium. Below the rete mucosa one comes upon glands, somewhat diminished in number and size, about one-third of which have the character of serous glands. The remainder are evidently mucous glands, which show considerable activity, as evidenced by their mucous changes.

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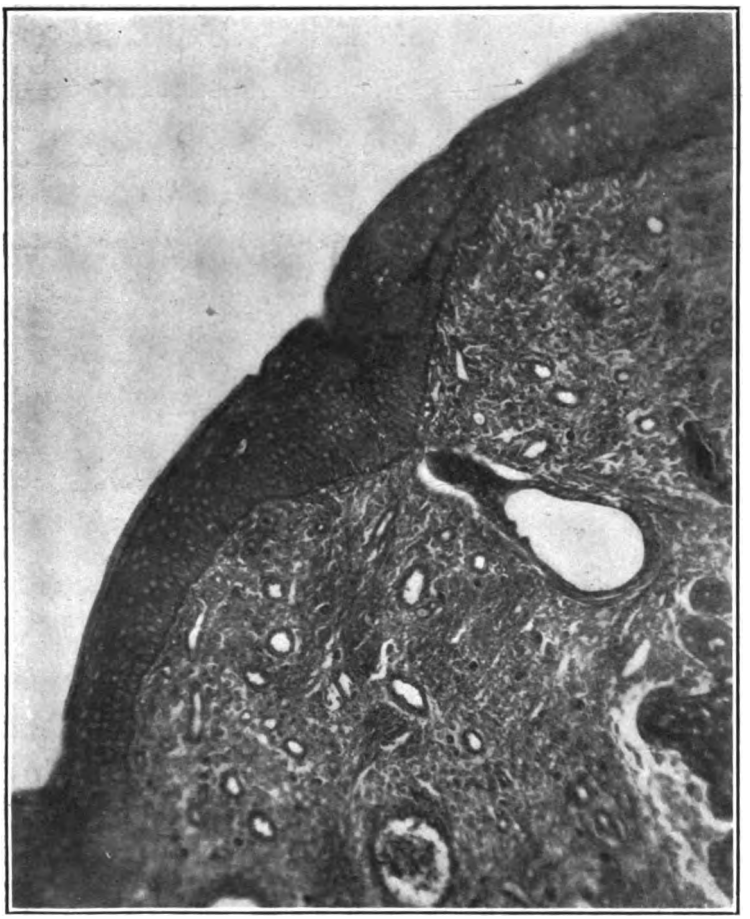

Fig. 2.—Atrophic rhinitis. Portion of middle turbinate from a case characterized by marked atrophy and ozena, showing compact squamous epithelium, passing directly into dense, fibrous tissue, without intervening basement membrane. There are no intercellular spaces evident in the epithelium and consequently little or no opportunity for passage of fluid in an outward direction. In the center of the field is a duct running from the mucous gland, of which a portion is seen on the right. X 125 diameters.

In addition to these instances of atrophic rhinitis, several cases were examined of dry anterior rhinitis. This term is used by Ribary to denote those cases of metaplasia of the mucous membrane of the septum in the anterior part of the quadrangular

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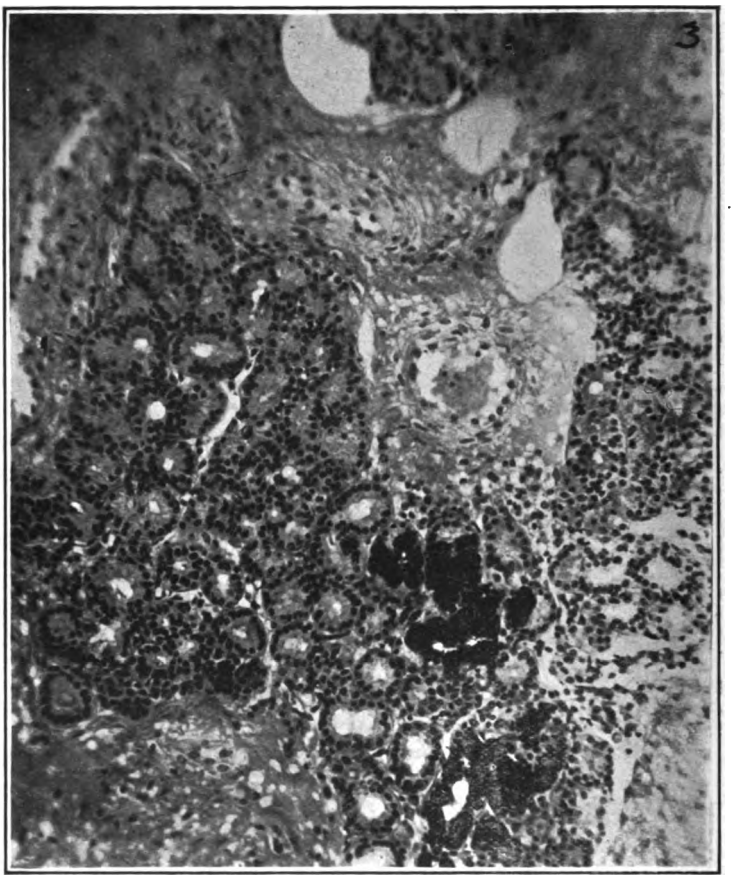

Fig. 3.—Vasomotor rhinitis of marked clinical severity. Portion of lower turbinate stained by mucicarmine, hemotoxylin and eosin, to show the comparatively slight activity of the mucous glands. All the mucin present is stained deep carmine by the mucicarmine, and appears consequently in the photo-micrograph as black. Of the remaining glands about one-third are serous glands, the others being resting mucous glands. No difference can, however, be seen in the picture, as the secreting capillaries of the serous glands are not visible with this low power. X 125 diameters.

cartilage, usually associated with a certain degree of convexity of the septum. The mucous membrane shows here epithelium of the squamous type, passing directly into the fibres of the rete-mucosa without intervening basement membrane. There is little or no evidence of diapedesis in these regions. The mucous

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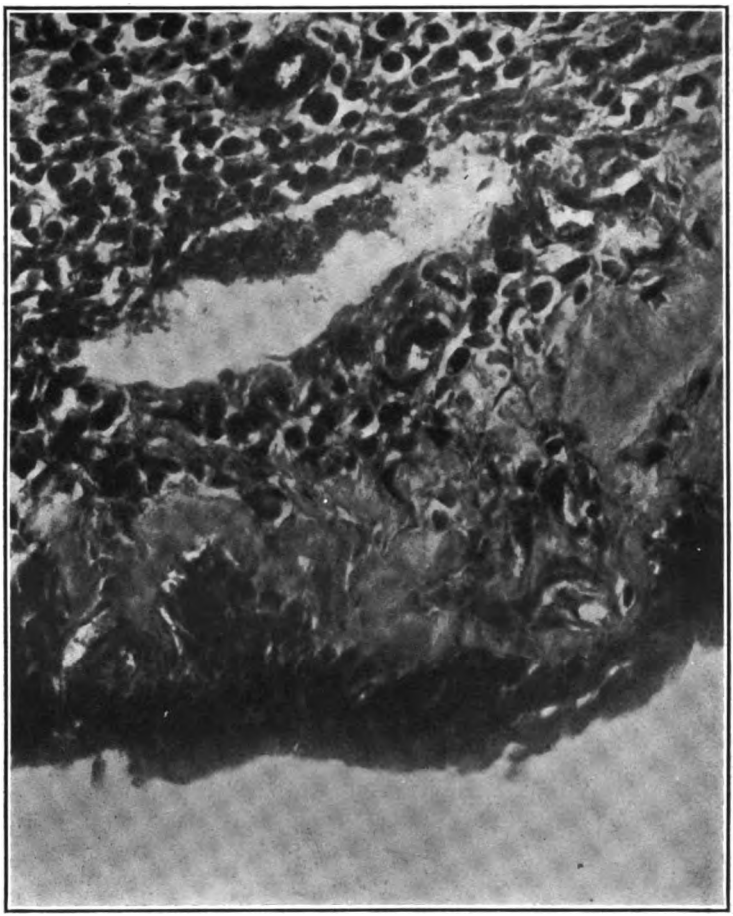

Fig. 4.—Vasomotor rhinitis of marked clinical severity. The columnar epithelium (deeply stained) shows a loose structure with numerous interspaces. Below is the basement membrane (lightly stained) with numerous large perforating canals. Below this is a marked cellular infiltration.

glands below are either absent or diminished in numbers. Where present they are small, and consist chiefly of mucous elements.

V. VASO-MOTOR RHINITIS.

Under this heading are comprised those cases characterized by a profuse, intermittent discharge of a watery secretion from the nose, either seasonal or perennial. These cases show certain

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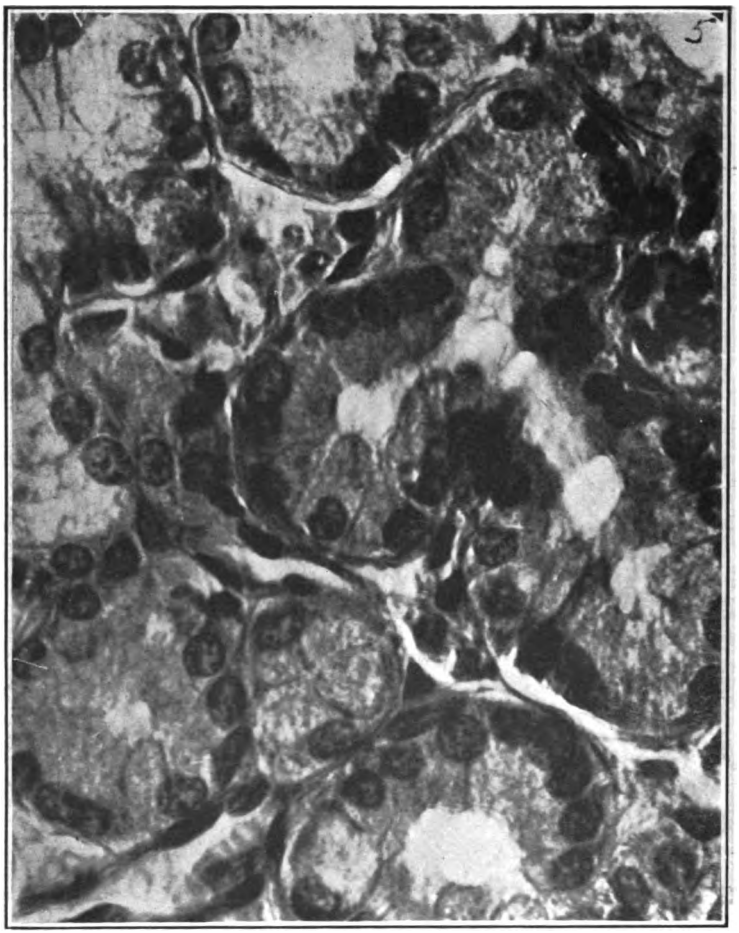

Fig. 5.—Serous glands in lower turbinate from a case of chronic rhinitis. In the center of the field, secreting capillaries are seen passing off from the lumen of the gland as fine, colorless tubuls, between the cells. X 750 diameters. Hemotoxylin and Congo red.

striking characteristics in common. The mucous membrane, if not previously subjected to destructive treatment, is of the columnar ciliated type, underlaid by a well-defined basement membrane, with exceedingly numerous and markedly dilated canaliculi. These canaliculi, as a rule, are crowded with polynuclear lenococytes. (Fig. 4.) In the rete mucosa and sub-mu-

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cous connective tissue there is an unusually marked infiltration of round cells of varying kinds. The sinuses, as a rule, are numerous and well developed. The glands show about one-third their number to consist of the serous type, the remainder being of the mucous form, either active or resting. There was no characteristic relation observed between the type of symptoms and the nature of the glands. Cases of marked clinical severity presented the greatest increase in the number and size of the canaliculi, which at times caused the basement membrane to assume the character of a loose mesh. In these instances the epithelial cells immediately above showed numerous interspaces filled with leucocytes, while a rapid exfoliation of epithelial cells was apparently taking place.

In reviewing the appearances found in the preceding conditions we may summarize the histological alterations as follows:

Simple chronic rhinitis is characterized chiefly by an increased development of the venous sinuses and of the glands. Hypertrophic rhinitis exhibits an increased proliferation of the epithelial, or of the connective tissues, or of the glands, although these latter, as a rule, play a subordinate part, while no characteristic alterations in the canaliculi are observed. In atrophic conditions the most important alteration in the present connection consists in the epithelial metaplasia, by which the pervious columnar ciliated epithelium and basement membrane are transformed into a dense, compact, squamous layer, lying directly upon a compact rete mucosa. The glands are diminished in number and size, but in a moderate degree, the mucous glands being well preserved and relatively active. In vaso-motor rhinitis the characteristic alterations consist in a marked increase in the number and size of the canals of the basement membrane, and in the perviousness of the overlying epithelium. With this is associated a marked, round-celled infiltration. The glands show a moderate increase in number and size, but there is apparently no increase in the amount of mucous degeneration, and it was not possible to demonstrate an increased activity in the serous glands.

Before entering upon a consideration of the preceding phenomena, it will be desirable to call to mind the following physiological facts:

First, with regard to the function of the nose, in supplying moisture to the inspired air, we know that a very large amount of

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Fig. 6.—Mucous glands from lower turbinate, stained to show degree of activity (mucicarmine). Immediately below the center is a convolution of which all the secreting cells show complete mucous degeneration. Above the center are two convolutions with resting protoplasmic cells. To the right are two with partly resting and partly active mucous cells. X 750 diameters.

aqueous vapor is being constantly exhaled, under normal conditions, approximately 500 g. in twenty-four hours. The greater portion of this comes from the nasal mucous membrane.

It is found that inspired air, after leaving the nose, on its way to the lower air passages, is practically saturated, so far as its

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own temperature is concerned, irrespective of external atmospheric conditions, whether these be cold and dry or warm and moist. Although the nose is capable thus of nearly saturating the inspired air, with reference to its own temperature, it must not be forgotten that the air, after passing the nose, attains a higher temperature in its course lower down in the lungs. We find that expired air is, under all circumstances, practically saturated with moisture. It is thus evident that the passages below the nose contribute this difference in moisture.

Speaking roughly, it may be said that the nose furnishes about two-thirds of the total amount of water evaporated from the respiratory mucous membranes, approximately 350 gr. in twenty-four hours.

While under ordinary conditions the moisture present on the surface of the nasal mucous membrane is derived from the secreting mechanism of the nose itself, nevertheless, it must not be forgotten that at times a portion of the nasal fluid comes from the condensation of *expired* aqueous vapor.

The amount of moisture which air is capable of holding depends upon the temperature of the air itself, increasing in direct proportion to increase in temperature. If air, at a given temperature, containing 100 per cent. relative humidity, is cooled, a definite amount of vapor becomes condensed, and falls as water, This phenomenon may be observed in the nose under certain conditions. During cold weather the temperature of the nasal mucous membrane is markedly less than that of the air passages lower down. Thus, air passing up from the lungs saturated with moisture strikes the cooler surface of the nose and experiences a lowering in temperature, with the result that a certain amount of moisture is deposited upon the mucous membrane. With the next inspiration a definite amount of this moisture is vaporized, and passes into the lower air passages, and is again expired. If the difference in the temperature of the nasal mucous membrane and that of the lower air passages is slight, this moisture in the nose is not perceptible, but if the difference be marked, the excess of expiratory condensation over inspiratory vaporization results in the accumulation of water in the nose in perceptible amount. This is the explanation of the occurrence of watery running from the nose, so common in the winter in many persons, and, as may readily be seen, is more marked in those of poor peripheral cir-

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culation than in robust individuals with a good peripheral circulation.

With regard now to the source of these 350 gr. of aqueous vapor, given off by the nasal mucous membrane, it seems probable that the largest portion comes by transudation through the canals of the basement membrane and interspaces in the columnar epithelium. Evidently the mucous glands can produce little or nothing of consequence, and it would be difficult to understand how the comparatively small number of serous glands could furnish the amount required. Several years ago, in carrying out some investigations on the respiratory functions of the nose, numerous experiments were undertaken with regard to the amount of water evaporated from the nasal mucous membrane under different conditions of external temperature and humidity. It was found that the nose was capable of nearly saturating the inspired air, irrespective of external atmospheric conditions, whether these were dry or humid. Rapid transitions in atmospheric conditions were tested with the same result. For this reason it is improbable that the glands of the nose played other than a subordinate part in supplying the evaporated vapor. If, on the other hand, we attribute the source of this vapor to transudation through the canals and epithelium, we have the problem at once removed from a physiological fluctuation in glandular activity to merely an increased or lessened osmosis through the mucous membrane.

We may, therefore, assume that the fluid present on the surface of the nasal mucous membrane is composed chiefly of the secretion of the mucous and serous glands, together with a definite proportion of fluid transuded through cellular interspaces of the mucous membrane. With this is mingled a varying amount of mucus, derived from degeneration of the epithelial cells, together with migratory leucocytes, and cellular detritus. Finally, under certain conditions of external cold, there is added by condensation a varying amount of water exhaled from the lower respiratory passages.

Under pathological conditions the glands and canals become altered. In chronic rhinitis, characterized by intermittent congestion and increased mucous secretion, there is found a heightened proliferation and mucous degeneration of the cells of the mucous glands.

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In chronic hypertrophic rhinitis, and its various forms, papillary hypertrophy and edematous hypertrophy, there is no proportionate increase in the activity of the glands or in the number of the canaliculi.

In atrophic rhinitis the glands are somewhat diminished in number and size, but the most striking alteration is the compact pavement epithelium and the entire absence of canals in the basement membrane. The transudation of fluid is thus suspended, and we encounter, therefore, a fluid consisting of mucous and albuminous secretions of the glands, together with a variety of cells and bacteria and their products.

In vaso-motor rhinitis we find an increase in the number and size of the canaliculi in proportion to the severity of the symptoms. The serous glands show possibly a heightened secretion, but the mucous glands show no evident increase in activity.

As a result of these findings, several therapeutic considerations suggest themselves. In conditions characterized by increased mucous secretion it is evidently useless to destroy a portion of the epithelium by caustics, except for the purpose of inducing better drainage or freer respiration. In atrophic rhinitis the patient does not suffer from lack of mucus, and it is difficult to understand how tablets of mucine could be of service. The ozenic individual is greatly in need of more water in his nasal secretion, and on theoretical grounds it would be desirable to introduce into the nose substances favoring exosmosis, especially if of hygroscopic properties.

Finally, we have on theoretical grounds another means of altering the amount of fluid evaporated from the nasal mucous membrane. This consists in increasing or diminishing the respiratory changes in intra-nasal air pressure. If, for instance, we place a partial obstruction in the anterior nares, the degree of inspiratory rarefaction is increased and transudation of fluid consequently heightened. This may explain the improvement noted in atrophic rhinitis from the injection of paraffin.

On the other hand, removal of anterior obstructions is indicated in cases characterized by increased watery secretion, as in vaso-motor rhinitis.

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Bibliography.

G. Retzius. Ueber die Anfänge der Drüsengänge und die Nervenendigungen in den Speicheldrüsen des Mundes. Biolog. Untersuch. Neue Folge III, 1892.

E. Müller. Ueber Sekretkapillaren. Archiv f. Mikros. Anat. Bd. XXXXV., p. 447, 1896.

S. Fuchs-Wolfring. Ueber den feineren Bau der Druesen des Kehlkopfes under der Luftrohre. Archiv f. Mikrosk. Anat.

P. Stoehr. Ueber Schleimdruesen. Festschrift, A. von Koelliker zur Feier seines siebenzigsten Geburstages gewidmet von seinen Schülern. Leipzig, p. 421, 1887.

F. B. Mallory. Pathological Technique. Mallory and Wright, 1903.

J. L. Goodale. An Experimental Study of the Respiratory Functions of the Nose. Boston Med. & Surgical Journal, Oct. 19, 26, No. 19, 20, 1896.

Ribary. Archiv für Laryngologie. Bd. IV., 1896.

P. Schiefferdecker. Histologie der Schleimhaut der Nose, etc., in Heymann's Handbuch der Laryngologie. Bd. III., lief 1, p. 87.

Hoyer. Ueber den Nachweis des Mucins in Geweben mittelst der Farbenmethode. Archiv für Mikrosk. Anat. Bd., 36.

R. Haidenhain. Physiologie der Absonderungsvorgaenge, in Handbuch der Physiologie. L. Hermann. Bd. V., Leipzig, 1883.

A. Haidenhain. Ueber die acinoese Druesen der Schleimhäute, etc. Dissertation, Breslau, 1870.

Discussion.

Dr. H. L. SWAIN had been much interested in the question of the glands of the nose. In decalcifying the bone of the middle turbinate some years ago he found that a great many mucous glands were situated in the region of the middle turbinate, in some instances there being a perfect mass of glands found. He believed this accounts for the fact that so much mucus is found in this region. He agreed with Dr. Goodale that much of the moisture probably comes to the surface through the canals between the cells of the mucous membrane. There was no reason why moisture that exists between the cells might not also come to the surface without going through a complicated process like exosmosis or of migration of the cells back and forth. With regard to the question of the amount of fluid existing in the nose at any one time, Dr. Swain would lay stress upon the fact that it is also probable that a great deal of the moisture found in the nose in cold weather comes from the lacrymal glands, and that therefore the accumulation of moisture present at any one time does not always represent nasal moisture, but does often represent the deposit of a large amount of water through the canaliculus into the nose.

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Dr. J. E. NEWCOMB had had some experience with the use of mucin in cases of atrophic rhinitis. He had read in the *Lancet* the article of Dr. Low, in which the use of mucin in such cases was mentioned. This was to be applied locally, and if desired the tablets of the remedy might be given internally. He was unable to find this remedy in the New York market and therefore had some imported. The quantity he received, however, was so small that he was unable to dispense it internally, and used it only locally. It comes in the shape of five-grain tablets and looks and smells like pepsin. Dr. Newcomb did not know whether it is derived from pig or calf mucus. Dr. Low in his article recommended that a solution should be prepared with five grains each of bicarbonate of soda and mucin, made up in half an ounce each of sterilized water and sterilized lime water, and applied on a cotton carrier or by an atomizer. If an atomizer is used, however, it should be cleaned out once a day by passing through it a quantity of clean water to prevent the tube from clogging. One disadvantage with regard to this solution is that it does not keep well in warm weather. The addition of a small amount of thymol would obviate this difficulty. Therapeutic results with the remedy were satisfactory.

He agreed with Dr. Swain that there could not be a too careful study of the subject under discussion. It must be remembered that there is still a very great deal of quackery going on in the treatment of nose and throat ailments, not only by recognized charlatans, but also by manufacturing chemists, and that the wholesale distribution of remedies is doing as much harm to the public in general as it is doing good.

Dr. GOODALE confirmed Dr. Swain's statement that there is found in the anterior end of the middle turbinate, and especially also in the portion of the septum immediately opposite, a large number of glands. In fact, he believed one of the most frequent alterations encountered in examination of this portion of the septum, viz., immediately opposite the anterior end of the middle turbinate, is a hypertrophy of the glands. He had sometimes thought that the pressure caused by this was responsible for the train of reflex symptoms which are so often found in the eyes. The matter of an increase of the lacrymal fluid finding its way into the nose in cold weather was a subject which had not occurred to him, but which he was glad to have emphasized. On theoretical grounds it would be possible to determine by investigation the exact amount of fluid which came from the air passages. Dr. Goodale's special object in presenting this paper was to call attention to certain recently discovered facts in the histology which he does not find in the literature of laryngology, and he hoped that further investigations of these facts will be carried on on the part of laryngologists themselves.

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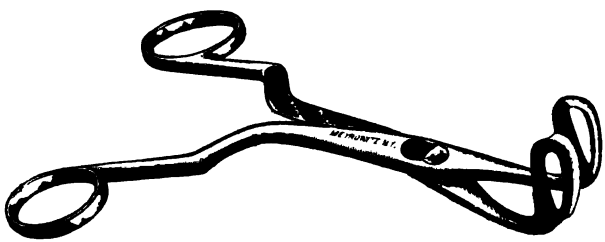
IMPROVED FORCEPS FOR THE REMOVAL OF ADENOID GROWTHS.

BY THOMAS R. FRENCH, M.D.

THE subject of adenoid growths in the pharyngeal vault has been so thoroughly thrashed and winnowed that to be justified in mentioning the word adenoid before this society one is expected to say or show something which is at least new. As this instrument possesses the merit of newness to some degree and as I am unable to attend the meeting, I feel privileged to accept the courteous offer of our Secretary to take it to you to look at.



The value of an instrument can only be proven by its use. This one has been in use since November last, and has been tested in two hundred or more operations; a sufficient number perhaps upon which to form an opinion of its merits. I exhibited a pair of forceps for the removal of adenoid growths before this body in 1899. The cutting edges of the older model are somewhat blunt, and, therefore, quite a number of seizures are required for the removal of the entire mass. Experience has proved that instrument to be lacking in power, because of too great delicacy in construction.

The new model is an improvement upon the former instrument, in that the cutting edges are as sharp as scissors and the upper curve of the cutting edges is considerably prolonged toward the handles. The instrument is much heavier and therefore stronger, grips firmly, and has a good balance. Although I have not had an experience to prove it, I am inclined to believe that the bite of

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the forceps is large enough to make it possible to seize and injure the vomer if the handles should be depressed, and the cutting end drawn forward. As injury of the vomer is apt to be followed immediately by free bleeding, and, as it increases the chances of secondary hemorrhage, it is highly desirable that that structure shall not be wounded. Forceps as large and powerful as these ought not to be used by inexpert operators.

If, after the forceps are passed up behind the velum, the cutting blades are widely expanded and pressed firmly upward and backward, and held as high up and as far back as possible, while the cutting edges are being brought together, almost every growth of moderate size can be completely extirpated in one cut, and not more than three or four cuts are necessary in any case to thoroughly eradicate every vestige of the growth.

I am now testing a still larger pair of forceps, which is even more rapid in its action than the one here presented. The model is the same as this one except that it has a longer cutting edge. I think it wise, however, to subject it to a more extended trial than it has thus far had before permitting it to be placed in the catalogue of the instrument maker.

Now that I am writing on one phase of the subject of adenoid growths, I hope that it will not seem strained to you, if in this connection, I give expression to a thought bearing upon the diagnosis of this affection in children. In a paper on Adenoid Growths with Special Reference to Adult Conditions, read by Dr. James E. Logan before this Association a year ago, the statement was made that, "A careful examination of many hundreds of cases reveals the fact that with very few exceptions, where we found enlarged faucial tonsils, there existed the same condition in the vault. Our records show but few exceptions, so few indeed that we are forced to accept it as the rule." This statement referred to children. My experience with this disease leads me to advance a step farther and say that in *all* cases of well-marked hypertrophy of the faucial tonsils, a mass of adenoid tissue will be found in the vault of the pharynx, of sufficient size to require removal. It is true that the mass is not always large, or in proportion to the size of the tonsils, but my statement is that the growth is in every case large enough to produce symptoms, or to be a menace to the health of the patient.

Adenoid growths are not always accompanied by hypertrophied

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faucial tonsils, but, basing the belief on the fact that I have never yet seen a case, not previously operated upon, of enlarged faucial tonsils without an accompanying adenoid growth, I think it perfectly safe to say that hypertrophied tonsils in children are always a proof of the existence of an adenoid growth in the pharyngeal vault. The diagnosis by means of the rhinoscopic mirror cannot often be made in children even by expert rhinoscopists. The passage of the forefinger is always a disagreeable if not painful procedure. If on depressing the tongue a diagnosis of an adenoid growth can be made, as I believe that it always can, by finding the faucial tonsils considerably enlarged, the ease of arriving at a knowledge of the existence of a growth will result in bringing relief to a much larger number of the subjects of this affection.

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PRIMARY ULCERATION OF THE TONSIL, TOGETHER WITH SOME REMARKS ON TONSILLAR ULCERATION IN GENERAL.

BY THOMAS J. HARRIS, M.D.

Our fellow member and ex-President, Dr. Charles H. Knight, in his recent text-book on Diseases of the Nose and Throat, remarks:

"It must have fallen to the lot of every practitioner of wide experience to be puzzled by a form of sore throat resembling diphtheria, but free from violent constitutional disturbance. A true ulceration goes on, involving a limited area or all the tonsil, either superficial or deep."

It is because of the puzzling character of this tonsilar affection. together with its infrequency and the question of differential diagnosis suggested, that the writer presumes to raise once more the oft-discussed subject of tonsil disease.

It is safe to say that no other single area of the upper respiratory tract has received half as much consideration from clinician and specialist alike, as has the faucial tonsil. The literature on its anatomy, physiology, pathology and treatment is well-nigh illimitable, and yet because of its importance it will continue to receive the attention of our best observers for years to come. Curiously

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enough, amid all this mass of recorded observations, little or nothing is to be found until very recently concerning primary ulceration of the tonsil.

Vincent, 1898; Raoult et Thiry, 1898 and 1900; Mayer, 1902, and Conrad, 1903, are among the few contributors to one or another phase of the subject. Moure was, in 1897 (as far as we know), the first to treat it comprehensively. This was followed by the classical and very complete article of Brindel et Raoult in 1900, which we have not hesitated to consult and use freely.

Primary ulceration of the tonsil may be defined to include all forms of tonsilar ulceration in which the ulcerative process has its origin in the tonsil and represents the entire cycle of the disease. It is to be distinguished from the *secondary* ulcerations, in which the ulcer develops in the course of some general disease, such as typhoid, diphtheria, etc.

Primary ulcerations of the tonsil are of several different causes and varieties as regards their mode of development and natural history.

Of greatest interest and probably of most frequent occurrence is

I.—*Membrano-Ulcerative Tonsillitis, the so-called Angina of Vincent.* In 1897 Vincent reported his first case, and since then numerous observers have confirmed his results. In brief, the clinical picture is as follows: An otherwise healthy young adult presents himself complaining of slight discomfort in the throat. There is a slight elevation of temperature, a coated tongue, some dryness in the throat, moderate dysphagia, loss of appetite, etc. At times any or all of these symptoms may be lacking. One tonsil alone is usually involved, occasionally both. On the side of the affected tonsil there is a moderate degree of adenopathy. Examination of the tonsil at the beginning of the disease reveals a grayish-white membrane resembling diphtheria. This discrete membrane is surrounded by a red zone of infiltration. Any attempt at removal causes bleeding, with re-formation the next day. The membrane gradually extends over the entire tonsil, which shares in the inflammatory process, becoming much swollen. This stage of membrane is followed in a short time (1 to 3 days) by the second or *ulcerative* stage. The ulcer at times has a flat appearance, with a hardened base. The edges often slope in as a crater.

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After cleansing the surface an eroded area is seen, covered "with blood points as if in a sieve."

The cause of the disease has been usually ascribed to an unhealthy condition of the mouth and teeth, as well as occasionally to cold.

As an exciting cause Vincent discovered in the smear from the tonsil two forms of bacteria; one or both is constantly present and is to be regarded as characteristic of the disease.

(*a*) The fusiform or *rod-shaped bacillus.* This is from 10 to 12 mm. long and 0.5 mm. broad, thickened in the centre and narrowed at the ends, thus resembling a *spindle.* At times it is short and comma-like. This form is most numerous at the beginning of the disease, and may not be found if sought for at an advanced stage. There are often several forms observed in one field, varying from the straight to those sickle-shaped, or even of an obtuse angle. Vincent recommends for staining them thionin and carbol fuchsin.

The second microbe is a spirillum. It has a wide curve and is hard to stain. Gentian violet seems to act most satisfactorily. Pure cultures have never been obtained.

The chief interest in the disease rests in the differential diagnosis from diphtheria and syphilis. While clinically it may prove difficult, the microscope will remove all doubt. It is not too much to say that in the past many such a case has been mistaken and treated for one or the other of these diseases. In the case of diphtheria the error can do no harm. A false diagnosis of syphilis, however, may be capable of serious harm to the patient.

The disease in question has a definite course, terminating of itself in a few days, with no sequelæ. The ulcer heals, the glandular involvement subsides and in the course of a week, under some simple applications, the patient is ready to be discharged. If now he has been told he has a grave blood disorder, and is placed on specific treatment, the throat trouble, it is true, disappears, but both patient and physician will be the subject of much needless anxiety and doubt, which possibly can never be fully cleared up.

CASE I.—The following case was seen by me last summer, illustrating the disease under discussion:

Anne G., age 7, was brought on July 31st to the Manhattan Eye, Ear and Throat Hospital. The child complained of pain

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in swallowing, on the left side of the throat. This had existed several days. There was no evidence of severe prostration. Temperature 101.6°. The left tonsil on examination showed no membrane, but a superficial ulcer in its upper portion, extending from one pillar to the other. On the affected side there was considerable glandular swelling and induration. The bacteriological examination showed numerous fusiform bacilli.

The course of the disease was uneventful, and recovery took place in a few days.

II.—*Acute Lacunar Ulcerative Tonsillitis.* Not all cases of ulceration of the tonsil, with or without membrane, will reveal these characteristic bacilli discovered by Vincent. Among other conditions which may produce it is that which Moure, in 1897, described as acute lacunar ulcerative tonsillitis. This has been well defined by Brindel and Raoult as "an ulcerative inflammation, benign and isolated, producing in the acute stage a latent encysted lacunar tonsillitis, and resulting in destruction of more or less of the tonsil." The clinical picture presents three stages:

1st. The pre-ulcerative.

2nd. Ulcerative.

3rd. Cicatricial.

It seems to occur most frequently in young subjects suffering from enlarged tonsils. The etiological factors are the same as those for Vincent's Angina, an unhealthy condition of the mouth and throat undoubtedly serving as a predisposing cause, as well as reduced general health. The symptoms present nothing characteristic, nor are they wont to be pronounced; rather discomfort referred to the throat than any real suffering. There is usually little or no fever, no adenopathy. Examination of the throat shows on the affected tonsil a smooth, rounded elevation surrounded by a zone of inflammation; the rest of the gland is to all appearances normal.

This *pre-ulcerative* stage must be seen early in order to be recognized. Soon this elevation breaks down and the stage of *ulceration* is reached.

It is interesting to note that with the ulcer comes no increase of the symptoms. It is equally true that while adenopathy ordinarily is not present, it does occasionally occur, as in Case II., to be reported below.

The ulcer is round or oval, variable in size, and at times is multiple. It is covered with a brownish detritus. In three or

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four days it can invade the entire tonsil, but never passes this limit.

The cicatrical stage comes on gently.

No specific microbe has as yet been discovered. A great variety of bacteria has been found, including at times even the fusiform bacillus. Fourteen cases examined by Brindel bacteriologically established this fact. Wingrave has found streptococci, staphylococci and slender rods in his cases.

CASE II.—The following case belongs to this class:

G. G., aged 28, consulted me Aug. 20, 1903, for a slight soreness in the left side of the throat. This had existed three days. The patient was a healthy subject, with no previous history of sore throat; all specific history was emphatically denied. He had frequently exposed himself, however, to such contagion, so the presence of a possible chancre had to be continually borne in mind. There were at no time any signs of the disease. Examination of the left tonsil revealed a small oval ulcer on its upper inner surface, of moderate depth. There was also a distinct though not marked swelling of the submaxillary glands on the same side. Temperature 99.5°„ tongue clean, no headache, slight discomfort in swallowing.

A culture for Kleb-Loeffler bacillus was negative; a smear showed no fusiform bacillus but many streptococci. Under the application of chromic acid the ulcer was healed in one week.

In this case there was no extension to the limits of the tonsil. The glandular swelling also soon disappeared.

As in the case of Vincent's Angina, the chief interest to the clinician lies in the differential diagnosis. Reference has been made to the possibility of confusing it with syphilis. Shurley, in his recent text-book on Diseases of the Nose and Throat, speaks of such a resemblance both to syphilis and tuberculosis. He refers also very properly to other possible causes, especially herpes or trauma. His observations are, however, at variance with most others, in that he states the ulceration may be found elsewhere than on the tonsil, as, for example, on the posterior pharyngeal wall. As has been just stated, the ulcer is usually limited to the tonsil surface, while according to Moure the appearance of the tonsil area affected is suggestive strikingly of the effect of a thermo-cauterization; he agrees that the greatest danger is in mistaking it for the ulcerating gumma. Like the ulcer of syphilis, the edges are clean cut. It differs from it in its loca-

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tion on the tonsil, being always near the centre, while the syphilitic gumma is found near the periphery, soon invading adjacent structures, including the anterior or posterior pillar, pharynx, etc.

Moure states further he has never seen the disease in children, or in persons over forty years old.

Finally, a possible confusion with the ulcer of the so-called acute lacunar tonsillitis is to be guarded against. Numerous observers, among whom are Moure and Braden Kyle, refer to the occasional occurrence of very small ulcers, cup-shaped in character, in the course of a case of lacunar or follicular tonsillitis. We have recently seen such a condition in a case of moderate severity. The ulcer was shallow and of small extent. The development of such ulcers, while not common, seems very reasonable, depending on the degree of microbic infection, together with poor resisting power on the part of the patient.

III.—*Pseudo Diphtheritic Ulceration.* A still greater source of anxiety, indeed of positive worry to us all because of the close resemblance to diphtheria, is that form of ulceration known variously as *pseudo diphtheria, false diphtheria, streptococcus diphtheria, or croupous tonsillitis.*

Bacteriology and the recognition of the Klebs-Loeffler bacillus have done much to remove doubt and to render clear the diagnosis of diphtheria. While certain points in this dread disease remain to be cleared up, authorities are now generally agreed to regard as true diphtheria only such cases as under proper conditions show the specific bacillus discovered by Klebs. Twenty-five to 30 per cent. of cases formerly diagnosed as diphtheria were, beyond question, cases of pseudo diphtheria. This does not mean for a moment that one is innocent and the other not. Diphtheria may be a trifling affair, soon recovered from; pseudo diphtheria may be very grave. The false membrane may be due to the fusiform bacillus, to the colon bacillus and others, but is, according to Prudden, usually due to *streptococcus* infection. Pseudo diphtheria may be *primary* or *secondary*. The primary form may be benign, with no loss of mucous membrane under the false membrane; occasionally the symptoms are very severe. There is high fever, adenopathy and dysphagia, suggesting a polymicrobic diphtheria. The false membrane is thick, friable, grayish-bloody in appearance, resembles diphtheria, and may involve the pharynx

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and nasal fossæ. It persists three days. After removal we find irregular ulcers of varying depth. The diagnosis from diphtheria can only be made positively by means of the bacteriological examination.

The *secondary* form is most often seen in connection with scarlet fever, occurring at the eruption period. It is of all degrees of severity, varying from the (a) *benign* form, healing in 8 to 10 days; the (b) *grave,* producing constitutional infection, suppurations, etc., to (c) the *septic* form, causing septicemia and death.

IV.—*Gangrene of the Tonsil.*—Gangrene of the tonsil may very rarely produce a primary ulcer of the tonsil. This may or may not begin with general constitutional symptoms. At times its onset is marked by high fever, involvement of the cervical glands, even cyanosis, profuse salivation, etc. The lesion may be *circumscribed* or *diffuse.* When *circumscribed,* a purple spot is seen on the tonsil, which soon turns dark and causes ulceration. The ulcer spreads rapidly, soon eating away all the tonsil.

In the *diffuse* form many plaques are seen, which soon unite to form one large ulcer. This ulcer extends in all directions, larynx, nose, etc., rapidly causing a fatal termination.

V.—*Syphilis.* Frequent reference has been made to the great liability of mistaking the various forms just enumerated for syphilis. This concerns chiefly the advanced processes of this disease. The tonsil is, however, not rarely the site of primary chancre, which can be passed over unless looked for. The general increase in size of the tonsil, the constant glandular involvement of the affected side, with the marked degree of induration. should make clear any existing doubts. The ulcer is not wont to be extensive, and is confined to the tonsil.

The appearance of the secondary eruption and ulcerations in the course of the chancre will tend to remove all remaining difficulty.

VI.—*Tuberculosis.* Primary tubercular ulcer of the tonsil is extremely rare. In a discussion of this subject recently before the N. Y. Academy of Medicine, only one gentleman could report a single case in his own practice. The appearance of the ulcer is similar to the much more common secondary form. It is liable to be multiple and to involve tonsilar pillars or pharynx. Beginning in miliary tubercles, which soon break down, a small ulcer

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develops of irregular shape, serpiginous in character, with a congested, enlarged tonsil. The ulcers soon coalesce and extend in all directions, often causing great distress in swallowing.

The particular purpose of this paper is to call attention to the primary forms of tonsillar ulceration. That such forms may be properly recognized the various and much better known secondary forms must be constantly borne in mind.

We do not propose to dwell at much length on these, as they have all been written on extensively and are generally well known. Some slight reference is, however, in order.

We have defined *secondary ulceration* as any ulceration developing in the tonsil in the course of any general systemic disease.

DIPHTHERIA.

Ulceration of the tonsil is among the possible manifestations of the more severe forms of diphtheria. The ulcer is not limited to the tonsil, as in acute ulcerative lacunar tonsillitis; is wont to invade the anterior and posterior pillars, soft palate, uvula and pharynx. A false membrane covers it, on removal of which an irregularly shaped ulcer of varying depth is seen. In extreme cases the ravages may be so extensive as to include the entire tonsil or tonsils as deep as the great vessels of the neck. In such cases a fatal termination is to be expected in a few days.

TYPHOID.

As in the case of scarlet fever, all the exanthematous diseases in their severer forms may have ulcerative manifestations in the throat. Typhoid fever, smallpox, typhus, are among the diseases in which occasionally such ulcerations are reported.

The ulcer of typhoid is multiple, round or oval, found at times on the tonsil, but oftener on the palate or pharynx wall. It is 4 to 20 mm. in size, and may be found on both tonsils. There is as a result intense dysphagia and a heightened gravity to the case.

TUBERCULOSIS.

Secondary tuberculosis of the tonsil is, while not very common, much more so than the primary form, the existence of which is even denied by some. The ulcer which results resembles in all

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points the primary ulcer previously described. The tonsil, it may be said, is not the only site of the ulceration in the throat. Ulcers in connection with those on the tonsil are wont to be found on the pharynx wall or soft palate.

LUPUS.

Closely allied to the tubercular ulcer is lupus of the tonsil. Primary lupus has never been reported. The secondary lesion in its shallow, serpiginous character resembles the tubercular ulcer. The tonsil when alone involved is liable to be increased in size. There is no adenopathy. The presence of certain areas of cicatrization in the adjacent tissues, or of lupus lesions elsewhere on the body, will tend to make the diagnosis clear.

SYPHILIS.

Syphilis in all its varying stages may cause ulceration of the tonsil. Reference has already been made to the chancroid ulcer. The later *secondary* ulcer is distinguished by being multiple, with clean, regular border and smooth base of a grayish-red color. Numerous mucous patches are wont to be seen on the tonsil or on both tonsils at the same time. An interesting variety reported by the French writers is the "diptheroid mucous patch," in which the ulcer is covered by false membrane. When numerous they cause much dysphagia. They are rarely, however, confined to the tonsil. Adenopathy is always present. *Gumma* of the tonsil is by all observers acknowledged to be exceedingly rare. The ulcerative stage which follows the infiltration and softening is a rapid one. The dimensions of the ulcer are variable. There is a clean-cut border with a red base. The center of the ulcer is filled by a white or brownish-white debris, which suggests a false membrane. This gradually sloughs off, leaving a deep cavity, which unchecked can make fatal extensions.

TERTIARY ULCER.

Much more common than the gumma is the *tertiary* ulcer. This occurs from the third to the fifth year of the disease. It is to be distinguished from the mucous patch by its late appearance, and from the gumma by the slow course of its development. The

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nasopharynx or soft palate is a more common site than the tonsil. The ulcers are grayish or brownish, with the base covered with a more or less thick and adherent false membrane.

SCROFULO-SYPHILITIC ULCER.

One additional form is rarely met with, the so-called scrofulo-syphilitic ulcer. During the past year such a case has been under our care and proved most baffling in its treatment. At first blush it suggests an extensive diphtheritic deposit, involving not merely tonsil but pharynx and soft palate. It occurs in the advanced stages of the disease, in our patient five years after the initial lesion. On removal of the false membrane, which quickly reforms, a flat ulcer of serpiginous shape is seen. The mucous membrane surrounding is very red. The ulcer gives surprisingly little discomfort. The general health is always poor. In the case just cited mercury was borne very poorly.

MALIGNANT DISEASE.

The appearance of the ulcer of epithelioma and sarcoma of the tonsil, coming as it does in the more advanced stage of a chronic disease, is so characteristic as to render any possibility of confusion with the various forms of primary ulcerations unlikely.

In conclusion, we would venture to lay emphasis on the following points brought out in the preceding pages:

(1) The great value of a bacteriological examination in all membranous or ulcerative conditions of the tonsil.

(2) The occurrence of several primary forms of ulceration of the tonsil, bacterial in origin, which can be, and doubtless have been, mistaken for the graver conditions due to diphtheria or syphilis.

(3) The almost irreparable harm which may result to the patient from a false diagnosis of the latter disease.

Bibliography.

Knight. Diseases of the Nose and Throat, p. 283.
Vincent. Arch. Internat. de Laryng., p. 44, 1898.
Raoult et Thiry. Soc. Francaise de Laryng., May, 1898.
Mayer. American Jour. of Med. Sciences, Feb., 1902.

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Conrad. Archiv. für Laryngologie, Vol. 14, p. 525.
Moure. The Twentieth Century Practice of Medicine, Vol. VI.
Watson Williams. Diseases of the Nose and Its Accessory Cavities, p. 97.
Shurly. Diseases of the Nose and Throat, p. 403.
Brindel et Raoult. Revue Hebdomadaire de laryng., June 23, 1900.
Holt. Diseases of Children, p. 1048.

Discussion.

Dr. EMIL MAYER referred to cases due to bacillus and spirillum of Vincent. All of the cases heretofore recorded have presented an acute condition without any aphonia whatever, but it has been Dr. Mayer's good fortune to recently see a case that was actually one of aphonia. It is stated as remarkable how quickly the membrane will disappear in these cases.

Dr. H. L. SWAIN referred to a case in which he used the microscope as suggested by Dr. Harris and found the Vincent bacillus. The condition cured up nearly completely in a few days but relapsed in the course of a month, requiring active local measures to cure it completely, the use of mercury being a factor in the treatment.

Dr. C. F. THEISEN in this connection reported that he had had one case of a child suffering from primary tuberculosis of the tonsils. In this case the sputum was examined by an expert clinician, but with a negative result. There was no evidence of pulmonary tuberculosis and it was therefore considered to be a case of primary ulcerative tuberculosis of the tonsil. Dr. Theisen stated that he has had a number of cases of tuberculosis of the larynx and of the upper air passages, and also some involving the tonsils, but that the case just reported is the only case of primary tuberculosis of the tonsil he had ever seen.

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Paper.

FACIAL ASYMMETRY AS A POSSIBLE CAUSE OF DEFORMITY OF THE NASAL SEPTUM.

BY HENRY L. SWAIN, M.D.

DURING the last three years Drs. Brackett, Arnold, and Hirst, of the three successive graduating classes at the Yale Medical School, have, at my suggestion, and with the kindly supervision of Dr. G. G. MacCurdy, measured and studied some of the skulls of the Marsh collection in Peabody Museum at Yale University, with a view to bring out a little more prominently, by comparing the various races, some of the causes of the arching of the palate. The idea was that perhaps some possible relation might be discovered as existing between the shape of the skull and the arch of the palate. A number of interesting facts have come out in the course of the work, some of which I reported to you last year in a paper entitled "The Arch of the Palate." I will briefly recapitulate some sections of this article, referring you to the original for details and measurements, and then finish up with our final studies.

The incentive to the whole work was a well-developed doubt as to the importance of the rôle which adenoids and the consequent nasal stoppage had in narrowing and raising the arch of the palate. It has always been an accepted belief that if the palate should over-arch, the septum nasi would have insufficient space to grow to its full stature and hence would bend to accommodate itself, and it was more the latter idea of the relation of the over-arched palate to the septum than the palate itself which determined me in starting this three year study.

An early assumption was that, if adenoids were all important in producing changes in the bony framework which resulted in over-arching of the palate, a measurement of a series of skulls of non-adenoid races ought to develop that they had broader and shallower palates in the gross average, and that there would be fewer wide variations or extensive over-archings. Such measurements were made by Brackett[1] in a series of Hawaiian skulls, and it developed that they possessed a perfectly normal index as

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regards the relation of the height to the breadth of the palate. We assumed as normal what had been developed as the correct average by a large number of different observers. The individual variations from the normal were fully as great as existed in the tables of numerous observers consulted.

Alkan,[2] in Germany, measured among others some Malay and Negro skulls, finding an average very closely approximating the European standard. It therefore seemed fairly demonstrated that even in non-adenoid races high palates could exist, and surely in the Hawaiians and Malays no trace of suspicion could be thrown upon the adenoids as the possible cause. Furthermore, as these Hawaiians belonged to the original race long before any effects of civilization could have made themselves manifest, it is possible in a native race to have the same individual differences as are evident among recent civilized peoples.

Grosheintz,[3] whose methods Brackett followed, came to the conclusion that "A high and narrow palate is usually combined with a small development of the upper part of the face. Small nasal and orbital cavities are associated in the rule with highly arched palates. The highly arched palate usually depends upon a congenital racial peculiarity of the skull and not upon the later extra-uterine influences of nasal-stenosis." This last conclusion was certainly worthy of comment, especially when contrasted with the very general belief to the contrary.

Brackett's final conclusion from his study of the Hawaiians was that "While the height of the palate bears no absolute relation to the shape of the face, still a long, narrow face with high, narrow anterior nares and orbit more often exists with a high palate than with a low one."

Alkan's opinions next attracted my attention, following the conclusion of Brackett's work. He differed from the other observers, and presented findings in complete accord with the orthodox version. He said, "The hard palate of the new-born child is characterized by its shortness. With increasing age the height and breadth increase but slowly, while the length becomes proportionately rapidly greater. In people afflicted with adenoid vegetations we find on the average a high, long and narrow palate, *i. e.*, a form which does not represent the normal. The shape of the hard palate has no connection with the shape of the skull. Anomalies in the position of the teeth are of frequent occurrence

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in those individuals with deformities of the palate or the upper jaw, and may be looked upon as due to the latter." His work was at hand when we began to study the palates of the Flathead Indians, and his methods were followed absolutely, so as to be able to make accurate comparison, by Dr. Arnold in his work of last year.

The latter found that a deforming process like the flattening could not only profoundly distort the whole skull, but also affected the palate. The latter was broadened and flattened, giving a greatly altered index. Alkan's index of the relation of the height to the breadth was 52.6, while the Flathead average was 33.4. Here also as among the Hawaiians there were wide differences in the height to be observed and chronicled in another presumably non-adenoid race. It seemed evident, then, that in a modified sense the shape of the skull, even though artificially altered, can and does affect the shape of the palate, even though there is no nasal stoppage whatever.

What seemed to us even more remarkable than the change in the palate, was a marked shortening and broadening of the nasal cavity, and while the height was thus lessened the septum was fully as straight as in other races. Hence it, the septum, so adjusted its growth as to adapt itself to its somewhat more cramped quarters.

At this time it was not possible for Arnold to measure all the changes that had taken place in the nasal cavity, so the matter has been taken up this year by Hurst,[5] and he has done a very large amount of work in the comparative measurements of the nasal cavities, with special attention to the posterior choanæ of the Hawaiians and the Flatheads. The former, it will be remembered, we proved in the previous work to have an exceptionally fine type of well-developed skulls, all their measurements conforming very closely to the European standards.

We attempted first to determine the proportion of general deviation of the two races. In both, among the adults, there were 19 per cent. of straight septa. The Hawaiians had 10 per cent. of posterior deviations, while the Flatheads had 12 per cent. among the adults. In the middle third of the septum, which includes practically the anterior part of the bony septum in our method of comparison, the adult Hawaiians had 71 per cent. deflections, and the adult Flatheads 68 per cent., which you see makes the dif-

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ference between the two races very immaterial indeed, inasmuch as there were four times as many Flatheads examined as there were Hawaiians. Measurements of a larger number of Hawaiian skulls would still further reduce this slight difference. Among the young Flatheads fully 50 per cent. possessed straight septa, with 41 per cent. having anterior deflections, so that the probabilities are that the rougher life of the adult Indian developed by traumatism many deviations from normal.

It will be seen that in both races 10 per cent. and 12 per cent. of deviations of the posterior septum were recorded. This does not include exostosis or other forms of thickening, but refers to an actual departure from the straight vertical line. However, in both races this was scarcely ever more than a millimeter, and in the vast majority of instances was under a millimeter, so that the general working rule holds good of even these original races, that the posterior edge of the septum rarely deviates noticeably from a straight line, a point I have been much interested in developing.

The vertical measurement of the posterior nares in both races brought out the adult Hawaiian to be 20.9 millimeters and the adult Flathead, 19.1. The breadth of the posterior nares, taken halfway between the top and bottom of the opening, was 13.9 in the Hawaiian, and 14.2 in the adult Flathead, making an index of the adult Hawaiians of 66.4 as against 74.3, a very considerable difference.

Now the variations from the average were vastly greater among the Flatheads than among the Hawaiians. While it is noticed that the average adult Hawaiian was 20.9, some of the Flatheads were as low as 15.1 millimeters, so that the difference between the lowest Flathead and the highest Hawaiian, which is 23 millimeters, is over 8 millimeters.

Inasmuch as frequently asymmetry in the width of the two posterior choanæ existed among the Flatheads, in order to strike an average which was anything like as accurate as were the Hawaiian measurements, it was necessary to measure across the entire posterior nares from one pterygoid process to another and divide that by two. A similar but much smaller difference was found in comparing the height of the choanæ of the two races. The combined width among the adult Hawaiians of the two posterior nares was, in the median position between the top and the

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bottom, never more than 32, the smallest being 26, which occurred a number of times. Among the adult Flatheads only occasionally did they measure as narrow as 27, and the widest was 37, so that between the lowest Hawaiian and the highest Flathead very large differences existed.

Now, it will be seen by comparison of the table as printed that, whereas it is comparatively rarely that any deviations of the posterior septum occurred, not more than 10 per cent. in the average of the two races, a vastly greater proportion of differences in the actual width and height of the two posterior choanæ existed among the adults.

Among the young Hawaiians there was no vertical or horizontal asymmetry, and only in 2.6 per cent. of the young Flatheads was there any difference in the vertical dimensions. In the horizontal direction, however, among the young Flatheads there was a difference in the two sides in 36.1 per cent., which is nearly half. Among the adult Hawaiians there was a difference in the vertical dimensions in 25 per cent., and in the width there was a difference of 61.1. When you average up the amount of asymmetry by taking the total differences, adding them up, and dividing by the entire number examined, it brings the entire amount of difference of asymmetry in the width of the Hawaiian posterior choanæ as .6 per cent. Among the Flatheads the story is quite different. In 46.7 per cent. the adults possessed differences in the vertical measurements, and 76.9 per cent., *i. e.*. over three-fourths, had differences in the width between the two sides. Furthermore the amount of variation differed greatly, so that when you averaged up the total amount of asymmetry in the vertical dimensions it was .53. The total amount of average difference in the width among the Flatheads was .9 per cent., half as much again as among the Hawaiians. The greatest amount of difference between the two sides in the width among the Flatheads was 5 millimeters, while it never exceeded 2 among the Hawaiians, and in by far the majority of cases was only 1 millimeter.

It seems to me most interesting and worthy of further mention that there was no asymmetry whatsoever among the young Hawaiians, and no vertical asymmetry to amount to anything among the young Flatheads, and furthermore that 50 per cent. of the young Flatheads had absolutely straight septa. This asym-

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metry among the adult Flatheads is even more pronounced when the whole skull is taken into consideration, and frequently the whole of one half of the skull would be greater than the other This led to a very peculiar facial development, the whole of one side of the face being greater than the other. In these cases of exaggerated growth of one side of the head there was invariably produced a considerable bend in the septum. It seemed as though the smaller side acted as a sort of restraining influence upon the other side of the septum, causing the effect of a string upon a bow, as it were, as is indicated in the rough drawing that I pass around, and the bending was either in the way of an arching toward the more powerful side, or it took a compensatory form, both varieties existing in about equal degree.

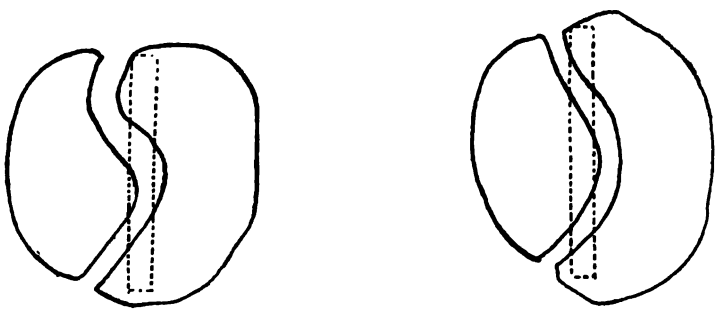

Fig. 1. Effect of overgrowth of one side shown in horizontal section

Here, therefore, is a new form of developmental bend. As we have generally construed the matter, there is but one form of developmental bend, namely, that produced by the over-arching of the palate. Now we have to add to that the possibility of a bend in the septum being produced by the over-growth of one side as compared with the other, making Class Two of developmental bends.

The fact that asymmetry of the posterior choanæ, even though small in amount, exists and frequently, as we have found it, by actual measurement among the Sandwich Islanders, and finding that this also takes place in the face leads to the probable assumption that facial asymmetry when naturally produced (as against the artificial form in the Flathead) may also cause changes to take place in the septum nasi.

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While these studies were developing a comparison between the Flatheads and the Hawaiians, it was with considerable interest that the work of Bentzen came to our attention. He was certainly most painstaking and thorough in developing the points which he tried to prove. One purpose of his investigation was to develop what effect could be traced to rachitis, first upon the face, and second what proportion of high, narrow faces had high palates, and the reverse. His final summing up showed that he believed that he had no right to put the matter any more strongly than had Brackett, as already quoted, that the highly arched palate is more often found in skulls with high, narrow faces than in the reverse type. To this Bentzen[6] added the interesting observation that before dentition children's skulls are frequently absolutely the reverse. He also stated as his belief that when all was said hereditary tendencies produced a given type at birth. If adenoids or other causes produced nasal disuse and mouth breathing, that particular palate would become narrower and usually, but not always, higher than it would have been had not such stoppage occurred. In those with a natural tendency to narrowing and in the narrow and high faced this would produce greater changes than in the naturally broad faced, and the amount of narrowing would be in direct relation to the length of time the nasal stoppage existed.

Regarding the deviations of the nasal septum, he found that septum deviations occurred in adults possessed of adenoids, (which assumes that the latter must have existed for many years,) in 16.5 per cent. and in those who had normal conditions in the nasopharynx in 15.6 per cent. "This," he says, "absolutely does not allow of any conclusion. Certainly it cannot be assumed that the septum deviation was favored by the increase in the height of the palate." He even asked the question, "May we not assume that the septum deviation was primary rather than secondary?" And inasmuch as in the cases in which there were no adenoid vegetations there was also found the over-arched palate, in the cases where the septum deviations existed he rather pertinently inquires, "May not the septum deviation actually produce the high palate?" If this is the case, it adds one more to the possible etiological factors.

Regarding the possibility of the leptoprosopic skull being the cause of the over-arching of the palate as well as concerning the

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influence of rachitis he believes that there could be in neither a direct connection. Inasmuch, however, as the individuals with deviated nasal septa are in the vast majority of cases leptoprosopic, we are right in assuming a close connection between the two, and therefore there arises the possibility that the leptoprosopia may through the production of deviation of the septum play a rôle in the development of the high palate. It is following this that he comes to the illuminating conclusion that if at the last he mentioned as contributing to the etiology of the overarched palate the inherited predisposition, he was bringing forward the most potential factor which is doubtless always present.

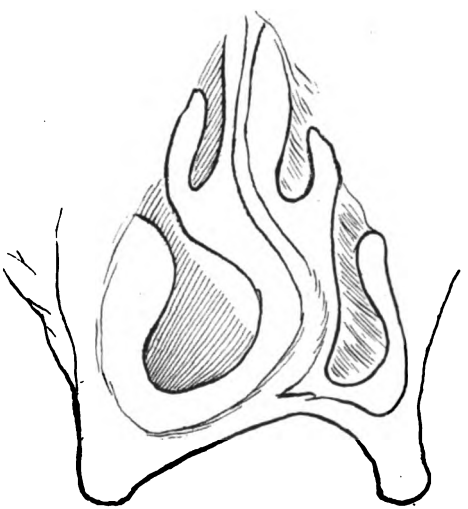

Fig. 2. The effect of overgrowth on one side shown in vertical section.

The last candidate for our consideration is Buser.[7] He has gone at the subject in a very enthusiastic way, but with a distinct mental bias toward the observations of Siebenmann. It is assumed that there is a law of "correlation," as it is called, between the shape of the skull and the form of the face, nose, and palate, and the effort has been to prove that this assumption is correct, using involved reasoning based upon very careful and numerous measurements. He measured the heads of 514 living persons who were in possession of good teeth, and on the basis of this believes he has discovered that there is certainly a "correlation" in the form of the face, skeleton, the bony nasal openings and the

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hard palate, and that one may assume the existence of two types of construction in the formation of the facial skeleton, namely, the leptoprosopic, high and narrow, and the chamæprosopic, the low and broad. In the former, in connection with the high and narrow, bony, nasal openings you find the high and narrow palate formation and a narrow dental arch. In these the second dentition has difficulty in finding the necessary space for the proper position of the teeth. The second form of face develops, together with a broad opening to the nasal chambers, a palate of considerable breadth and a broad "U" shaped dental arch.

Through the interference in breathing which occurs most frequently with the hypertrophy of the pharynx tonsil and the accompanying swelling of the nasal mucous membrane, there occurs a narrowing of the small respiratory openings in the leptoprosopic skull, while the same condition occurring in the chamæprosopic often has no influence whatever upon the calibre of the wide nasal channels, so that naturally you find mouth breathing in the leptoprosopic oftener that in the chamæprosopic. This "correlation" in the structure of the facial skeleton explains with the least difficulty the extremely frequent occurrence of mouth breathing with the high palate, the narrow and "V" shaped bending of the dental arch, and the anomaly of the position of the teeth. He believes that "correlation" in the facial skeleton is the reason why observers find among those that have an enlarged pharynx tonsil so often the high palate and narrow arch and deformed teeth rather than that the hypertrophy itself is the cause of it. He believes that the anatomical conditions absolutely negative the possibility of the compressing influence of the slightly tightened cheek and mastication muscles producing changes in the shape of the facial skeleton.

Consequently we can briefly sum up his ideas in the statement that inherent racial peculiarities of the skull produced the conditions, rather than that any possible change could result from the fact of the nasal stoppage altering or even exaggerating the changes in the growth of the face.

Taking it all in all, his position is the most radical of any of the observers that I have thoroughly studied. Leaving aside his views as regards the palate, it certainly would seem impossible that the nasal stoppage should exist through the growing period of the child and have absolutely no effect whatever upon the facial

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development. Whether the septum deviates independently from the arch of the palate or not we will, also, lay aside for the present, but it seems to me that the arguments brought forward by Buser leave one in a very helpless condition, and fail to explain certain facts that are positively observed. For instance, I have no doubt that a careful observation of nasal conditions existing previous to and following the work of the modern orthodentist will show that changes in the dental arch do widen the palate and do give added nasal space and better nasal breathing. If that is the case, then the obverse must be equally true, that changes do take place in the face from pathological conditions, and I still for the present incline to Bentzen's more moderate view as before expressed in this article.

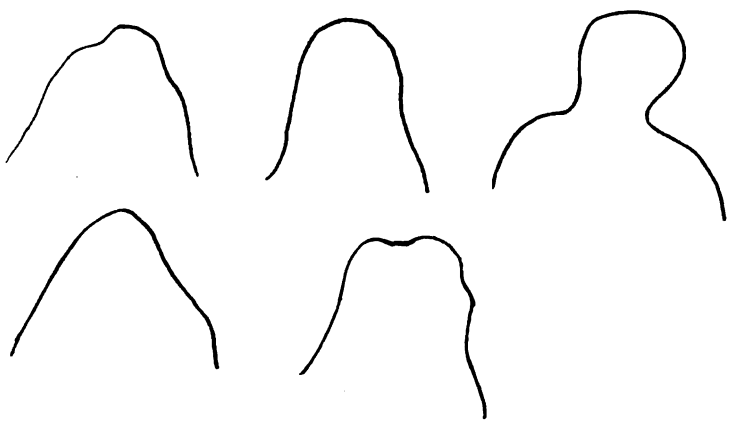

Fig. 3. Peculiar distortions of the dental arch which are also accompanied by equivalent changes in the hard palate.

Alkan observed in his paper that among new-born children there were certain palates that had already begun to assume a tendency toward high-arching. Buser very properly concluded that, therefore, all high-arched palates cannot by any means be said to depend upon the presence of adenoids. It does not follow that adenoids which exist for a long time have no influence upon the nose, but it is certain that that effect has been over-estimated in years past, and that by all such studies as these a more correct estimate may eventually be brought about.

Now to return to the anatomical make-up of the face, the nose, and the septum. The septum is the last of the bones to completely

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ossify. The facial bones, including the superior maxillary and the turbinate bones, all are ossified before it.

It has been shown that among the Flatheads and among the Hawaiians at least facial asymmetry does exist, and that with facial asymmetry you have a change in the septum not from effects on the palate alone, but by the over-growth of one side overpowering and bending around the smaller and weaker side.

Since the discovery, nearly a year ago, of this relation, the possibility of facial asymmetry contributing toward bends in the deviations of the septum, I have been greatly impressed by the enormous number of people the one side of whose face is different from the other. In a great many instances, without attempting to tabulate or estimate in figures, I have observed that bends of the septum exist bearing a certain relationship to the greater side. This facial irregularity is almost invariably present in the markedly leptoprosopic and would readily account for the existence of asymmetrical arching of palates and nasal narrowing. The observation of any large number of faces in any gathering of people will show you that there are frequent instances where not only is one side of the skull and face greater in one direction but also in all, so that it is perfectly easy to see that the vertical as well as the anterio-posterior and the lateral dimensions differ, in which case the same line of reasoning as we deduced, which makes it possible for horizontal deviation to occur, would render it also possible for vertical deviation. This fact, together with Bentzen's belief and Buser's very radical conception, would tend to add to the possible causes of septum deviation this other factor, namely, an inherited predestined shape of the skull, which without necessarily bringing into the discussion at all nasal stoppage, may bring about septum changes. We may have, therefore, septum deviations occurring without trauma, without over-arching of the palate, and without adenoids interfering with nasal respiration. Admitting these factors as possible, immediately the consequences of a hanging jaw as producing a narrowing of the face sinks into complete insignificance. It would seem impossible that, with the strongly buttressed bones which are made to stand the strain of the strong mastication muscles, the mere weight of the slightly depressed lower jaw should drag the face out of proportion and distort parts which withstand the stronger action of the other muscles. Yet this is just what is the fact if we lay any weight to the

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idea that mouth breathing causes changes in the bony framework of the face and palate by the mere lateral pressure of the cheek muscles. Talbot[8] strongly contends this point, and well says that by no possible stretch of the imagination could it be conceived that the irregular curves of the dental arch, which means, of course, also changes in the shape of the palate, were produced by a perfectly equally divided weight pulling equally on both sides of the face, as is the case of the hanging lower jaw. There are no muscles or bands which could possibly be considered as performing this distortion when you take into proper estimation the attachments of the muscles themselves.

If I then stop and sum up what may logically be deduced from this series of studies which we have made on the skulls of the Hawaiian and the Flathead, together with much which has in the meantime appeared in literature, we cannot escape the following conclusions:

Adenoid stoppage does not always, and may never, cause over-arching of the palate. Over-arching of the palate does not always produce bends of the septum. Over-arched palates and bent septa often occur together, and each is more frequent in skulls which are leptoprosopic. Leptoprosopic skulls and faces almost never exist in a marked degree without some distortion or over-arching in the palate and changes in the nasal cavity. In a young child about to develop into marked leptoprosopia, pronounced or complete nasal stoppage by adenoids cannot fail to add to the degree of the deformity by interfering with the normal growth of the superior maxillary bones, not the least item in which is the stunted growth of the maxillary sinuses from lack of proper aeration and air interchange in the nose.

If the first teeth are early removed and the dental arch disturbed, then the palate will usually more easily become narrowed and pointed in its own arch.

We would rule out of the causative influences toward over-arching of the palate the dragging on the cheek muscles, resulting from a dependent lower jaw in mouth breathers, although in a previous paper some slight weight is placed on this item.

When, as a result of inherent tendencies, aided and abetted by nasal stoppage, there has been produced a smaller nose than normally would be correlated, then the septum nasi, as the last bone to be fully ossified, may cease to be perfectly straight, because it must

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find a place in a structure harder than itself. It must therefore yield to the irregularities in the growth of the other bones.

The study of the Flatheads has demonstrated how great an influence the distortion of the shape of the whole skull may have upon the nasal cavity as a whole and also upon the palate, and that the asymmetry of the skull appears to have produced not only a difference in the size of the two parts of the nose, but also bends in the septum. Observations of the living show exactly such bends to be present when there is marked facial asymmetry, and that facial asymmetry is very often present.

This all brings us back to what Welcker is reported by Bentzen to have said, in 1882, that asymmetrical development of the entire bony nasal cavity, together with the hard palate, was the cause of septum deviations, and to this we will add that the causes of asymmetrical development are more often inherited or congenital than acquired.

SEPTA AND POSTERIOR NARES COMPARATIVE TABLE.

SUMMARY OF RESULTS AS MEASURED BY DR. J. H. HURST.

RACE.	Y. H.	A. H.	Y. F.	A. F.
Skulls measured	9	39	36	169
SEPTA.				
Straight septa	—	19%	50%	19%
Posterior deflection	—	10%	9%	12%
Mid deflection only	—	71%	41%	68%
POSTERIOR NARES.				
Vertical average	18.3	20.9	16.0	19 1
Horizontal average	12 8	13 9	12.4	14.2
Index	69.9	66.4	77.5	74.3
Vertical asymmetrical	nil	25.0%	2 6%	46.7%
Horizontally asymmetrical	nil	61.1%	36.1%	76.9%
Average vertical asymmetry	nil	.:8	.02	.53
Average horizontal asymmetry	nil	.60	.27	.90

Y. H. — Young Hawaiian.
A. H. — Adult Hawaiian.
Y. F. — Young Flathead Indian.
A. F. — Adult Flathead Indian.
All measures are expressed in millimeters.

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References.

1. Brackett, E. S., Graduating Thesis, 1902, Med. Dept. of Yale.
2. Alkan, Fraenkel's Archiv, Bd. X, S. 441.
3. Grosheintz, Fraenkel's Archiv, Bd. VIII, S. 395.
4. Swain, Arch of Palate. Trans. Amer. Laryngological Assn., 1903, or Laryngoscope, October, 1903.
5. Hurst, Graduating Thesis, 1904, Med. Dept., Yale Univ.
6. Bentzen, Fraenkel's Archiv, Bd. XIV, S. 203.
7. Buser, Fraenkel's Archiv, Bd. XV, S. 503.
8. Talbot, Laryngoscope, May and June, 1902.

Discussion.

Dr. JOHN O. ROE considered this subject extremely interesting. He said Dr. Swain has very clearly pointed out the conclusions which have previously been reached, that the purer the race, the straighter the septum; the more composite the race, or the ancestral tree, the more often is encountered a deflected septum. Heredity, therefore, plays an important part in this connection. It is a well recognized fact that a child may inherit from one parent one peculiar feature and from the other another peculiar feature. If the child should therefore happen to inherit the nose from one parent, and the mouth and jaws from another, the septum may not therefore fit the place assigned to it, nor have sufficient room for proper development, and therefore of necessity becomes deformed. In the evolutionary changes that take place in the mixture of the races, we might well say with Pontiquet, "that a man has only exceptionally the septum which belongs to him."

Defective development also plays an important part in the ethnology of the deviations of the septum. The septum, as we know, is composed of two plates, each having its centre of development. If these plates grow unequally, because of hyper-nutrition of one, or defective nutrition of the other, according to the law of compensation, a deflected septum results. Also, if a disproportionate development of the bones of the face takes place, we may have what has been designated as a "scoliosis of the face," with which is invariably associated a deviated septum.

There are a great many conditions to be considered as etiological factors, the most important of which, however, are hereditary and defective development. Diseases of the nose and naso-pharynx often play an important part in the proper development of the nose. Obstructions of the nasal passages interfering with the respiratory function of the nose play a very important part in the influencing of its developments. This is often seen in children afflicted with adenoids. Dr. Roe had in many instances seen one

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child in a family which had adenoids and which also had a deviated septum, an imperfectly developed nose and a high arched palate, whereas none of these conditions were present in those having unobstructed nasal respiration.

Dr. A. COOLIDGE, JR., stated that when the Association met in New Haven cases were reported by him of congenital occlusion of the posterior choanæ by bony plates. Some of these cases were unilateral, others bilateral. As this condition was congenital there had been absolutely no breathing up to the time the patients came to be treated, at which time the bony plate was found and removed. If mouth breathing or breathing through one side only of the nose always influenced the shape of the skull, these cases would be markedly deformed. All of these patients were adults and had either not breathed through the nose at all or only through one side, yet they did not show any particular tendency to high arch or deviation of the septum. One or two cases of bilateral occlusion were observed in which there was marked deviation of the septum, which deviation must therefore have been due to some other cause than obstructed nasal breathing. If complete occlusion of the nares does not always cause high arching of the palate, adenoids might easily fail to produce this result.

BONE AND CARTILAGE IN THE TONSIL.

BY JAMES E. NEWCOMB, M.D.

THE interest of the writer was first called to this subject some years ago by the paper of Stirling hereinafter referred to, and a record has been made of the few instances of the condition since appearing in current literature. This interest was renewed some two years ago by a personal experience, the particulars of which are briefly as follows.

A lady of about thirty years, nurse, came for consultation in regard to frequent though slight sore throats. Examination showed moderately enlarged faucial tonsils. Their removal was advised and agreed to by the patient. The Mackenzie instrument was employed and the right tonsil removed without incident. A few days later the operation was repeated on the left side, and as the blade of the instrument was driven home, the sensation was experienced of driving through some hard substance which, however, was easily pierced. Examination of the tissue removed re-

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vealed the presence of a small rounded tip of bone. Palpation of the tonsillar stump at once showed that this tip belonged to the styloid process, the remainder of which could be easily made out. It came nearly to the surface of the stump, but was covered thereby sufficiently well to prevent irritation, as was verified by a very recent examination. Palpation on the right side did not reveal anything abnormal. The case was therefore one of abnormal length and direction of the left styloid process, the tip of which had been removed by tonsillotomy.

Under normal conditions the styloid process has a length of two and one-half cm. and extends from the under surface of the temporal bone downward, forward and inward. It is derived from the second branchial arch, and according to Toepfer its free end is always cartilaginous. Bony nodules have been found in the stylo-hyoid ligament.

The recital of an unusual clinical experience is apt to start up other similar recitals, so that it soon becomes evident that a condition assumed by the first reporter to be rare is in reality quite common. It is not possible to say just how common the anomaly described really is. As a matter of fact but few instances are on record. One of the most striking is that of Richards, who in the case of an elderly woman found himself unable to sever the tonsil with a tonsillotome. Palpation showed a hard mass calling for the use of bone forceps. After this the tonsil was easily severed. The same condition, though to a less marked degree, was found on the other side.

In Richards' case it was possible for him to detect bone marrow in the fragment removed. He appends a note from Prof. Thomas Dwight of the Harvard Medical School, who notes that ossification frequently extends down to the stylo-hyoid ligament thus apparently lengthening the process proper. To reach the level of the tonsil a length of from 5 to 6 cm. of bony structure would be necessary. Three cases were reported by Stirling some years ago.

CASE I was that of a young woman with cheesy matter in the tonsillar crypts. On the right side there was a hard mass coming from behind the tonsil forward underneath it to the level of its anterior surface, ending in a point and forming a part of the side of the organ. The point was rounded and about an eighth of an inch in diameter, but broader and somewhat flattened laterally as it extended backward, outward and slightly upward. The finger in front entered the angle formed by it and the inferior maxilla, and when pressed behind it entered another angle formed by its

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proximity to the right side of the vertebral column. There was present a tenderness from the pinching of the mucosa between the body and the finger.

CASE 2 showed a slight protuberance just above and in front of the right tonsil; otherwise it was in general like Case 1, but the condition was bilateral.

CASE 3 was a brother of Case 2. Here the condition was bilateral. The hard masses were altogether in the posterior portion of the tonsil and reached a level a full finger breadth below the lower border of the organ. The mass was more slender than in the other two cases, was distinctly cartilaginous in feel and was movable.

In making his diagnosis, Stirling excluded calculi as not giving the conditions present. The mass might have belonged to the jaw but did not move with it. The finger could exclude the vertebral bodies. The masses were too far forward to come either from the base of the skull or to be regarded as spines on the posterior portions of the sphenoid wings. He concluded that they must be either the transverse processses of the vertebræ or the styloid processes and finally decided in favor of the latter. He found one reference to the condition in Schech's book and references by the latter author to cases reported by Grube, Lücke and Weinlechner, but these reports were not accessible to the writer.

I do not know that any great importance attaches to the condition unless the projection should be long enough and the direction of the styloid process oblique enough to cause tonsillar irritation. In most if not all the cases reported the abnormality has been discovered accidentally. If after tonsillotomy the stump should not be sufficiently padded by the soft tissues there might be a condition awkward to relieve, but such relief could undoubtedly be afforded by the use of bone forceps, as in Richards' case. In the comments of Prof. Dwight on Richards' case he notes that "it is perfectly in accord with all we know of the process of growth of organs that if a bony structure should encroach on the domain of adenoid tissue the latter should, so to speak, fold itself around it."

When we come to the question of bony deposits scattered through the tonsils we find a more voluminous literature, as the subject has been considered by several authors who have also found cartilage and have considered the two conditions together. Personally I have removed tonsils which on inspection showed

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masses too large and too hard to be regarded as foci of connective tissue and I have surmised that they might be cartilaginous, but this view has never been confirmed by microscopic examination.

Several years ago Walsham reported two cases bearing on this matter.

CASE 1 was that of a man of fifty years, whose senile tonsil showed scattered through it, at the base of the crypts, numerous small bony masses in the shape of nodules, rings and trabeculæ. They did not encroach on the lymph structure of the organ.

CASE 2 was that of a patient with an atrophied tonsil, a man of twenty-seven years. Through the lymphoid structure of the organ were scattered masses of cartilage large enough to be detected by the eye. In places it had been converted into bone. The matrix appeared sometimes hyaline, at other times fibro-cartilaginous. The cartilage was in the form of nodules surrounded by strands of dense fibrous tissue which formed a sort of perichondrium. Some penetrated the lymphoid tissue and in one place they nearly reached the epithelial covering.

Walsham regarded them as enchondromata, finding a close analogy between them and the small cartilaginous growths which sometimes develop about the branchial clefts and which are also found in the neighborhood of the ears; also analogous to the cartilage found in the parotid gland.

According to His, the tonsil is developed in the fourth month of fetal life by a simple infolding of the mucosa at a spot between the second and third branchial arches. This site remains visible in the adult tonsil as the operculum or triangular fold which frequently extends over from the anterior faucial pillar, veiling the tonsil's antero-lateral aspect. As development progresses the primary infolding which is the original lacuna splits at its base into secondary lacunæ and the fully formed organ results from the swelling of the mesoblastic tissue and the early appearance of the lymph follicles. According to this view, the cartilage is of fetal origin, *i. e.,* is the vestigal rest of the second branchial arch. From this view Kanthack dissents, regarding the cartilage merely as a metaplasia of fibrous tissue.

Walsham was able to find two similar cases reported by Roth and one by Deichert, who himself knew of two other cases. Walsham found the condition twice in thirty-four autopsies.

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The enchondromata result from the starting up to renewed growth of these vestigal rests.

Wingrave found cartilage three times in examining two hundred tonsils. He regarded these deposits as identical in formation with the sub-pharyngeal cartilage of Luschka. As did Walsham, he found hyaline and white fibro-cartilage imbedded in dense connective tissue capsule, sometimes in the fibrous bed, sometimes in the lymph pulp of the organ. In one instance the cartilage was calcified.

Nösske found multiple bone and cartilaginous deposits in the deeper layers of connective tissue coating the tonsil. Almost always there was a connection with the surrounding connective tissue as well as numerous transition pictures between the two. This author would include in etiology inflammation, retrogressive changes and a sort of local predisposition.

Petroff examined the tonsils excised from a patient who had died of pulmonary tuberculosis, finding tuberculous foci and as well, cartilaginous deposits. Further investigations on forty tonsils removed from twenty-two cadavers of both sexes and varying ages revealed cartilage and bone in eleven, cartilage alone in ten and bone in one. All the tonsils showed a fibrous degeneration. He regarded the condition as due to a chronic inflammation with proliferation of connective tissue and deposit of lime salts.

Reitmann refers to the work of Pollak, who explained the formation of bone on the basis of "cretification" of tuberculous foci after an inflammatory process. To the process he gave the formidable name of "Amygdalitis hemorrhagica interstialis chronica ossificans." Reitmann himself refers to twelve cases collected by various authors and examined three human embryos together with fifty tonsils removed from thirty-seven individuals, the age limits being an embryo of thirteen weeks and a living patient of sixty-five years. Of the tonsils, seventeen or thirty-four per cent. gave a positive result, showing that the condition may be more frequent than is generally supposed. His general conclusions are as follows: Cartilaginous nodules or their derivatives occur in the tonsils or surrounding tissues. They are generally hyaline, rich in cells but poor in basement substance, that is, resemble embryonal cartilage. In two instances retrograde changes were evident. Various stages of transformation from bone to cartilage were found. Cartilage always lies free from any attachment to the

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skeletal frame. The condition found in one of the embryos allowed him to believe that he had to do with a derivative from the second branchial arch, arising not in continuity but rather as an offshoot. He does not regard this theory of origin as positively proven by any evidence thus far brought forward, nor is he certain that these vestiges can serve as a starting point for either enchondromata or osteomata.

Very recently Zuckerkandl has stated that cartilage develops independently of the skeleton in the connective tissue of organs when mechanical relations demand the presence of such tissue, as for instance in the Eustachian tube. In many of the lower orders of life only fibrous tissue is found in this latter structure. He reports the interesting fact of finding in a pharyngeal tonsil removed from an adult lion, 1st, a superficial adenoid layer, 2nd, a connective tissue layer and 3rd, glands between the two. In the connective tissue layer cartilage was found between the glands and follicles. It is not a constant feature in this animal, as it were absent in a dead-born animal and also in an embryo.

An interesting case has been studied by Rosenberg and Toepfer, the former reporting the clincal and the latter the histological details. A peculiarity of the case was that it was the first one in which muscular fibres were found in the tonsil. They were found in the connective tissue capsule of the organ and certain of them had thrust themselves into the trabeculæ running in from the capsule. Toepfer considered them as belonging to that group called "musculi tonsillares," which normally are on the outside of the capsule. The tonsil showed hyperkeratosis and it is surmised by the writer named that the fibres were the cause of irritation to the tonsillar substance resulting in the hyperkeratosis. In the same organ were found foci of hyaline cartilage in the connective tissue portions. Against the theory that these were due to developmental disturbances during fetal life, that is, of the branchial arches, is the fact that first development of the tonsil begins between the fourth and fifth month at a time when little or no vestiges of the branchial arches remain. Moreover the cartilage was found in the purely connective tissue portions only of the organ, never in the lymphoid pulp, and finally the deposits were multiple. In a second tonsil two larger deposits were found and here could be recognized the transition stages in the change from connective tissue to cartilage. The fibres of the latter separated,

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allowing the cells to project, then swelled, forming a network in the meshes of which were the cartilaginous capsules in which the cells lay. These had gone over from the spindle-shaped to a more polygonal form. How long this process may require, and what is its exciting cause we have no means of knowing.

Toepfer observes that if the cartilaginous foci are merely aberrant deposits from the branchial arches we ought to find them in all sections of the organ, but we do not so do. Or it might be supposed that they had spread out through the tissue into which they had grown. Against this view was the fact that each deposit stood by itself with its fibrous envelope, that is, the assumed perichondrium, but everywhere there was a certain connection between the cartilage and its connective tissue environment. Hence Toepfer's main proposition is that the deposits result from connective tissue metamorphosis. In some sections the transition seemed to have gone farther than above described, so that it appeared as if the groundwork of bone had been laid down preparatory to the deposition of lime salts.

With certain staining agents pictures were seen suggesting an earlier colloid state, and a later mucoid state. It is difficult to say whether or no this mucoid stage is a transition between colloid and the material out of which hyaline cartilage is formed The whole process may be a retrograde one, that is, the retrogression of cartilage into mucoid material. Evidence suggesting this was found in the fact that in the middle of the areas out of which the cartilaginous deposits originated, there was a focus of softening or a small hollow filled with mucin and some round cells.

This transition from connective tissue to cartilage is not, according to Toepfer, to be looked on as a late or senile change in the former, for the same process has been found in children. Since the deposit comes from a cartilaginous matrix, it must be regarded as an enchondroma, while the hyperplastic mass which comes from pre-existing connective tissue is an ecchondrosis.

The author just named thinks that the results of examination of tonsils vary according as the organs are removed from the cadaver or the living body. Virchow has suggested that the connective tissue which has newly formed itself as the result of chronic interstitial processes is the matrix of the later enchondroma. Owing to the numerous inflammatory processes going on

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in the tonsils it is conceivable that cartilage should arise on the same basis. Wingrave found cartilaginous nodules in chronic hyperplastic organs but other observers have found them in normal organs.

Finally it may be noted that the Eustachian tube is formed from the first branchial arch; a portion of the cartilage might be shut up in the tonsil, since according to Kölliker the first position of the tonsil is in a line with the tube but somewhat more dorsal. Zuckerkandl found cases showing cartilaginous nodules in the vicinity of the tubes, especially in the salpingo-pharyngeal ligament.

REFERENCES.

Deichert, Virchow's Archiv., Band 141, p. 435.
Lubarsch, Virchow's Archiv., Bd. 177, p. 371.
Nosske, cf. Ctbltt. f. Lar., Vol. XIX, 1903, p. 498.
Petroff, cf. Ctbltt. f. Lar., Vol. XIX, 1903, p. 498.
Reitmann, Mon. f. Ohr., Vol. XXXVII, 1903, p. 321.
Richards, Jour. Am. Med. Assoc., Vol. XXXVII, 1901, p. 242.
Rosenberg, cf. Ctbltt. f. Lar., Vol. XVII, 1901, p. 492.
Ruckert, Virchow's Archiv., Bd. 177, p. 387.
Stirling, Jour. Am. Med. Assoc., Vol. XXVII, 1896, p. 734.
Toepfer, Arch. f. Lar., Band XI, p. 1.
Walsham, Lancet, Vol. LXXVI, 1898, p. 394.
Wingrave, Lancet, Vol. LXXVI, 1898, p. 750.

Discussion.

Dr. CORNELIUS G. COAKLEY stated that in his researches on branchial cyst in connection with his paper, he was surprised to see how often in the walls of these crysts cartilage and bone were found. He also found some bone in the anterior surface of the posterior pillar of the fauces, and some on the cellular tissue under the lateral wall of the pharynx. It seemed easy to account for some of the bony growth as being the result of failure of or faulty development in the branchial clefts.

Dr. JOHN O. ROE in this connection reported a case in which he struck against a very hard substance while attempting to remove an enlarged tonsil with a snare. This osseous formation was found to be the end of the styloid process, projecting into the tonsil for nearly half an inch, which he removed with a pair of bone forceps.

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Paper.

LARYNGO-TRACHEAL INJECTIONS.

BY THOMAS HUBBARD, M.D.

THE practice of making laryngo-tracheal injections for the purpose of direct medication was first advocated in a practical and consistent manner, with clinical reports, by Botey of Barcelona in a communication to the Academy of Sciences, Paris, 1890.

The early history of the art is very interesting. In this enlightened age we wonder how men dared to have positive opinions on such obscure anatomical regions as the larynx and trachea. Dr. Horace Green, a man of convictions and ambitious to convince, expressed very positive conclusions concerning the practicability of pulmonary medication by means of a long flexible tracheal tube. This led to the "Bronchial War" on Manhattan Island. It lasted with remissions from 1847 to about 1854, a seven years war in the wilderness as it were, for the laryngoscope had not then dispelled the mists of confusion. The New York Academy of Medicine gave this unique exhibition in medical polemics. Again and again incredulity demanded clinical demonstrations. After several failures the redoubtable Dr. Green proved to the special jury appointed that it was possible to pass the tube into the trachea. A lighted candle placed near the end of the tube was extinguished, and a toy balloon was inflated, to demonstrate that the tube was in the air passage and not in the esophagus. A solution of silver nitrate was injected into the bronchi and the subjects survived. The controversy was taken up by the daily press, thus prejudicing the profession, and in the end the honor due to Dr. Green seems to have been ethically assigned to a half century of oblivion. There is no doubt but that in selected cases much benefit was derived from this method of treatment, but the pathology of pulmonary diseases was so obscure that no definite conclusions could be drawn.

The question was finally settled by the Academy in a thoroughly judicial manner—the jury disagreed. The verdict of the minority of one is prophetic: "The results of this method of treatment, whether it has been employed in bronchial affections or in the

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commencement of tuberculosis, have already afforded the most gratifying indications that practical medicine will be greatly advanced by the discovery." (Signed)

FORDYCE BARKER.

In his state of ethical retirement Dr. Green was in excellent company, for Morton was then under the ban of professional disrepute for attempting to patent the process for making sulphuric ether.

It is somewhat remarkable that, in reviewing the foreign literature on this subject, one finds no mention of these very ingenious experiments of Dr. Green's. To him undoubtedly is due a great honor. His published clinical results merited attention, but unfortunately he made no distinction between tuberculosis and more readily curable bronchial diseases, and as we can understand in the light of modern pathology, his claims were beyond reason.

The invention of the laryngoscope directed attention to study of the larynx and upper respiratory tract, and even locally the teachings of Dr. Green and his allies seem to have been lost sight of. Now that diseases of the nose and throat seem well understood, we go back half a century and develop the method so courageously advocated by Green.

Direct tracheal medication by means of injections was undoubtedly practiced by many prior to the publication of Botey's paper in 1890. There are a half score of claims to invention. Garel and Dor were working along this line in 1888. Bechay and Rosenberg published in 1889. Bichat and Colin experimented in tracheal absorption, and Heryng, Bronner, Sendziak, St. Hilaire and others were using the method contemporaneously with Botey. Mendel improved the technique and published results of treatment with various combinations of medicaments. He awards the claim of priority to Botey, and after having contributed much toward developing his method and defining its limitations he proceeds to throw the whole matter into confusion by promulgating his so-called "going it blind" method.

This seems to be simply an attempt to half drown the patient by injecting with force against the post-pharyngeal wall medicated fluid enough so that some of it must spatter into or overflow into the larynx. The object is commendable—that is, to make it practical for patients to administer treatments to themselves, but it is a bungling method, and scarcely worthy of the prolonged con-

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troversy it stirred up. In 1901 Rosenthal and Weill revived the suggestion of Dubois, that of injecting through the anterior tracheal wall by a specially devised syringe and canula.

These incidents in the evolution of the method are mentioned chiefly to impress the fact that the literature of tracheal injections is full of absurd and impractical experiments. The practical clinician has been rather repelled than attracted. The impression has been cultivated that tracheal medication is a specialty within a specialty. The meagreness of text-book literature which we in America regard authoritative gives the impression that the method of Botey has not been adopted as a routine practice by laryngologists in general. It is only by familiarity with the practice that one can appreciate its superiority over other methods in common use.

Prominent among American writers who have advocated the method and enlarged its field of practical application are: Thompson, Murray, Anderson, Simpson and Donellan. Thompson administers tracheal injections in a variety of pulmonary diseases, including even broncho-pneumonia, bronchitis with emphysema, chronic bronchitis, bronchiectasia and tuberculous bronchitis and laryngitis.

My own experience of about four years impresses more decided limitations. Thompson and others admit that injections do no good, and may even do harm, during the acute hyperemic stage of any type of inflammation. In a severe bronchitis involving the whole bronchial tract it is a matter of clinical observation that a part may have reached the stage of resolution and yet another portion of the tract be in the active inflammatory state, so that the mere fact that a patient with more or less extensive bronchitis is expectorating freely is not an indication that injections may be practiced. One must wait until the stage of invasion has passed and acute febrile reaction subsided and until the general systemic condition is favorable to recovery before beginning this treatment, and then in reality it is simply the residual bronchitis, caused in part by the accumulation of more or less irritating secretions, that the treatment aims to relieve. In ordinary bronchial affections I would say that properly administered tracheal injections take the place of so-called stimulating expectorants, and during the period of convalescence from acute bronchitis the recuperative power of the patient is decidedly fortified and nutrition favored by relieving

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the gastro-intestinal tract from the disturbing influence of cough sedatives and expectorants in syrups *ad nauseam.*

Anderson has published the results of very important experiments bearing on bronchial absorption. Olive oil is quite rapidly taken up by the glands and can readily be detected in the parenchyma soon after injection. Alkaloids manifest their physiological effects very promptly, and iodine can be detected in the urine when injected in an oil menstruum. Many of these physiological data have long been accepted, and it seems to me have little bearing on the merits of the question in so far as ordinary acute affections are concerned. Tracheal injections are not given for the purpose of any degree of systemic medication. Absorption is not the object. The treatment is essentially local. The purpose is to encourage free secretion of sero-mucus and further to prevent the fermentation or decomposition of accumulated deposits and production of catarrhal sapremia. Oil is the best menstruum because it is a non-irritant and the medicament can be retained longer in contact with the nerve filaments irritated by the acrid secretions or in mixture with accumulated muco-purulent deposit to prevent decomposition.

This is emphasized by the fact that of all medicaments proposed guaiacol and menthol in one to three per cent. solutions are acknowledged to be the best. The former is a readily volatilized and diffusable antiseptic and stimulates a sero-mucus flow, and the menthol lessens nerve irritability.

Anderson has had excellent results in bronchial asthma, and my experience is decidedly corroborative. In so far as chronic bronchitis is a factor, the tracheal injection is almost specific in its effect. To be sure, in this class of cases we are confronted by peculiar idiosyncrasies and it must be understood that the classical general treatment cannot be supplanted by merely local medication. In fact, all things considered—the neurotic element and the chronicity of these cases—I would place tracheal injections as very useful adjuvants to the general treatment of bronchial asthma.

This method of treatment is especially applicable to fetid bronchitis, bronchiectasia, and also to the treatment of bad breath of pulmonary origin, a condition dependent upon vicarious gaseous elimination rather than a definite lesion.

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Murray, Barton and others advocate tracheal injections in tuberculosis, believing that positive curative results are obtained in incipient cases, and it is Barton's practice to instruct patients in the art, so that by the aid of a mirror they can practice injection daily. With others, he emphasizes the point that laryngeal manifestations of the disease are inhibited or prevented. It is not my purpose to dwell particularly on the application of this method to the treatment of tuberculosis. Dr. Murray has recently contributed his favoring experience to the society; but I would emphasize the point that tracheal injections are of undoubted utility in alleviating the distressing cough and laryngo-tracheal irritation, and in a measure preventing laryngeal erosions.

The technique of tracheal injections has not been materially altered from that described by Botey. The long curved laryngeal canula attached to the Muir syringe of about 8 c. cm. (2 drams) capacity seems to be the favorite. Donnellan uses a canula having lateral perforations near the tip to irrigate all parts of the trachea. Most operators use cocaine anesthesia prior to injections as a routine practice. There are certain subjects not amenable to this method, throat and larynx being so uncontrollable that the trachea can be reached only by prolonged effort. They are rare, and in skillful hands the majority can be treated with ease and without subsequent discomfort. Following the treatment there is more or less coughing, but if a suitable quantity has been injected, this seems to me an advantage. It serves to churn the oil with accumulated secretions and exposes more membrane to its effects. The deep inhalations carry the healing and sedative medicaments, volatilized by the warmth of the bronchi, deeper into the bronchioles. One can test the efficacy of the medication by observing the cloud of vapor with each expulsive cough, and this is often visible some time after the injection. Patients frequently state that they can taste or smell the guaiacol on coughing for six or even twelve hours after treatment.

For two years I have used a modified canula. In all cases where the vocal cords can be seen in the mirror I have found it easy to inject the fluid from a canula having about a half-inch bend —not long enough to reach below the tip of the epiglottis. A few drops of guaiacol-menthol solution in the larynx gives sufficient anesthesia, so that on a second trial the desired amount, one-half to two drams or more, as indicated, can be dropped directly into

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the trachea. It is frequently possible to so tilt the patient to right or left that the fluid can be allowed to flow down the left or right wall and into either main bronchus. The sensation of slight irritation is located by the patient over right or left bronchus. Occasionally it is necessary to use the long canula inserted to the glottis, but as a routine practice this is neither desirable or necessary.

Besides the various types of bronchitis amenable to this treatment I would add that I have found it very useful in laryngitis, excepting, of course, the acute hyperemic state. It is astonishing how tolerant the larynx is when the warm medicated oil is dropped directly into it, and I have found that even a watery solution of argyrol is tolerated. As compared with the swab or spray the efficiency of this method seems to me superior. Sub-glottic inflammation, sub-acute and chronic, and especially that type associated with lithemia, is more satisfactorily treated by this method than by any other with which I have had experience.

Concerning the medicament used, there is decided unanimity in choice. Leaving tuberculosis out of the question and considering only the ordinary types of laryngitis, tracheitis and bronchitis, the solutions required are few and of well-known efficiency in affections of mucous membranes. A bland oil, sterile of course, is the menstruum. The majority prefer fresh olive oil, but an absolutely pure petroleum oil is probably equally good, and in some respects more desirable than the vegetable oil. Most of the petroleum oils on the market have been treated by chemicals in precess of refining and are more or less irritating. There is a chemically pure Russian oil, which is the product of fractional distillation and is non-irritating. Anyone can make the test of purity by adding iodine crystals to the oil. The chemically refined oil will oxidize or reduce the iodine, producing a colorless solution in a short time, but the iodine color will be retained in the chemically pure oil indefinitely. It can also be demonstrated by the starch test.*

With iodoform I have had no experience, but have no doubt that in some cases it is indicated.

*One decided advantage of chemically pure petroleum oil as a menstruum is that it never becomes rancid and corrosive to the metal canula, as does olive oil. This greatly simplifies the question of care of the syringe and permanence of prepared solutions.

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Formula.

Menthol in olive or C. P. petroleum oil.. 1 to 3 per cent.
Guaiacol " " " " " .. 1 to 2 per cent.
Iodine " " " " " .. pink.
Argyrol in water.....10 to 25 per cent.

Mendel's Formula.

Iodoform
Guaiacol
Essence thyme
" cinnamon
" eucalyptus .... aa 5
Olive oil 100

Bibliography.

Botey: Ann. d. Mal. de l'Oreille, etc., 1897, XXIII.
Reviere and Vincens: La Medicine Moderne, Jan. 9, 1901.
Mendel: Arch. gen. de Méd., Nov. 17, 1903.
Boyer: Verhandl. d. Gesell. Deutscher Natur-forscher und Aerzte, 1898, p. 293.
Barton: Jour. Tuberc., 1902, IV, 136.
Donellan: Therapeutic Gaz., May 15, 1902.
Thompson, J.: Am. Med. Ass'n, June, 1897; Transact. Ohio State Med. Soc., 1898; Transact. Ohio State Med. Soc., 1903.
Simpson: Dis. Nose, Throat, Ear. Posey and Wright, Philadelphia, 1903.
Anderson: Phys. & Surg., Detroit, Feb., 1902; Med. News, Sept. 28, 1901; Jour. Tuberc., July, 1902; Jour. Mich. State Med. Soc., March, 1904.
Murray: Transact. Am. Lar. Ass'n, 1900.

Discussion.

Dr. J. W. GLEITSMANN said that he had intended to read a paper upon this subject before the Laryngological Section of the American Medical Association, but was prevented. He agreed with Dr. Hubbard in his statement that the subject is covered by a large amount of literature. He went over it and found about seventy or eighty references, quite a number of which Dr. Hubbard had mentioned in his paper. The majority of the writers, and it is thought also the men who use the medication at present, agree that it does some good, and in selected cases is often most satisfactory. With regard to the application of the remedy, Dr. Gleitsmann stated that he is not able with certainty to inject a sufficient quantity of the liquid oil into the trachea without a laryngeal mirror. He did not think there is any possibility of introducing

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the long canula, which he thinks necessary, below the cords and into the trachea without the aid of a mirror, although a certain amount of the liquid may be injected into the larynx very easily without the aid of a mirror. For this purpose it was suggested that the patient should inhale deeply, and during the moment of inhalation the liquid should be put down. Dr. Gleitsmann was not satisfied, however, with the small amount applied in this manner, and generally used about from one to two ounces. In the beginning of the treatment he used Hartwell's laryngeal syringe, holding about a dram.* He had seen many good results and great improvements. He had used it in many cases of long-standing cough, not due to anything but an extensive cold or bronchitis. One such case was relieved permanently and in the other considerable improvement took place during the time of treatment, but the old condition had returned. He used benzoinol and menthol, with or without one per cent. guaiacol. He had also used this preparation with small quantities of camphor, but thought it best to leave it out, as he found it set up an irritation. He now confined himself to benzoinol and menthol, which had proved very satisfactory, the patients seeming to have invariably improved.

Dr. W. K. SIMPSON believed that in intra-tracheal injection was found one of the most positive means of both local and constitutional effect upon bronchial and pulmonary conditions, and that the time was coming when it would be a very popular mode of treatment. There were, however, quite a number of things about its use which must be considered. It was not so satisfactory until one became very familiar with it; a considerable amount of technique was required. He had used it many times, but thought it best to precede its employment with local anesthesia produced by cocaine administered in spray to the larynx, one-half of one per cent. being sufficient. He also considered that it was absolutely impossible to use the tracheal syringe without the use of the mirror; in fact, he did not think it possible to do anything of an intra-laryngeal nature without the aid of the mirror. He had always used the long syringe, because his experience had been that if one could get the nozzle of the syringe between the cords and a spasm occurred, the syringe would already be in the trachea and one could keep on with the injection. With a small trachea a spasm would cause its closure, and the fluid would not enter as well as into a large trachea. He thought that when patients were not accustomed to the use of the intra-tracheal syringe, it was apt to bring about a spasm. Another question presenting itself was whether there was any danger other than the temporary spasm produced in certain cases. He mentioned one instance in which pneumonia followed the use of the syringe. The patient was a

*Later on a Hartmann's syringe with hard rubber canulas of his own device and of different curvature (demonstrated to the Association).

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very robust man who had a cough, pure and simple, of a spasmodic nature. It was difficult to make a diagnosis in this case, the cough yielding to no form of treatment. The intra-tracheal injections were finally tried, but after three or four weeks, the patient developed a pneumonia. It was Dr. Simpson's opinion, however, that this mode of treatment had in many conditions of the bronchial tract a very decided value.

Dr. EMIL MAYER thought that sufficient stress had not been laid upon the temperature of the injected fluid. It was important that the temperature of the fluid should be warm, and Dr. Mayer thought that when the fluid was injected into the throat it should be of the same temperature as that organ.

Dr. J. E. RHODES stated that it was possible to use a ten per cent. solution of menthol in tracheal applications, and did not understand why a one or two per cent. solution only was advised.

Dr. JOHN O. ROE suggested the use of chloroform for the purpose of relieving the irritability of the throat in making the intra-tracheal injections, and considered it a far better agent for this purpose than cocaine. More or less irritation of the larynx, frequently attended by laryngeal spasm, was almost always caused by the applications to the larynx, particularly of irritating substances, like nitrate of silver. If, however, a few drops of chloroform were inhaled until the patient begins to feel the effects of it slightly, the application could be made with the greatest ease and cause the patient no disturbance. By this means, the use of cocaine, or other local anesthetics, was entirely unnecessary, and they could not fail to have an undesirable effect. Those who had never tried this method of temporarily obtunding laryngeal sensitiveness to the introduction of instruments or irritating remedies, would, he was sure, find it of special service.

Dr. G. HUDSON-MAKUEN stated that he had owned an intra-tracheal syringe for fourteen or fifteen years, but has used it only occasionally. He made it a rule never to use on his patients anything which he would object to have used upon himself, and he doubted if he should care to have an intra-tracheal injection made to his throat. However, he believed that if one could avoid touching the epiglottis, spasm would not be produced. He then referred to a device presented by Dr. Freer, of Chicago, before the Section on Otology and Laryngology of the American Medical Association some years ago. It was a little canula which he had fitted to the tip of the Davidson atomizer. These canulæ were of different lengths, and as the tip could be made to reach a little below the chink of the glottis by the aid of compressed air, it was then possible to spray directly into the trachea while the patient inhaled long and deeply. Dr. Makuen used this in cases where he was unable to use the syringe, and had been able to keep it up for from 30 to 60 seconds, and thus spray into the

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trachea a dram or more of oil. This was not regurgitated, but taken down into the trachea and bronchial tubes, and was tasted in the mouth for hours afterwards. Dr. Makuen considered it a rather better device in some cases than the intra-tracheal syringe. He inquired why if this method of treatment were good in chronic cases, it was not also applicable to acute cases?

Dr. J. L. GOODALE agreed with Dr. Roe that the use of cocaine for the purpose of producing a local anesthesia in patients where frequent treatment is necessary, was to be deprecated. There was a combination which he had used, viz., a combination of a saturated solution of eucain B. with a little adrenalin. By adding to a saturated solution of eucain B. a few drops of adrenalin chloride in 1-1000 solution one has a very excellent local anesthetic, nearly equalling cocaine in the completeness and rapidity of its action.

Dr. HUBBARD had had little experience in producing constitutional effects, as suggested by Dr. Simpson, and in tuberculosis considered the treatment chiefly applicable for relief of distressing bronchitis. He thought the question of anesthesia of the larynx was of small importance, because in using the short curved canula the tip does not even touch the epiglottis, and properly directed one could inject fluid into the trachea in all cases where one is able to see the glottis or below it. He found that injection during short quick breathing was better in some cases than attempting to inject the fluid during prolonged inspirations. In regard to the case mentioned by Dr. Simpson he did not consider the employment of intra-tracheal injections justifiable in any case unless there was positive indication for it. He at first made an effort to have the temperature of the injected fluid about that of the body, but in subsequent use he had not paid so much attention to this, as it seemed unnecessary. In answer to Dr. Rhodes' inquiry regarding the use of ten per cent. solution of menthol injected into the trachea, it must be remembered that with the temperature of the trachea there is an immediate vaporization of the menthol, and one therefore gets a much more pronounced effect than when applying it to the throat. With regard to Dr. Makuen's statement that he uses on his patients only what he would have used on himself, Dr. Hubbard stated he became a convert to this method because he used it on himself. After severe attacks of bronchitis, he found that he could, by the aid of a hand-mirror, inject one dram or more of the solution directly into the trachea, and he is sure that anyone would become a convert to the method if he could experience the immediate relief resulting from such injections. In regard to the question, that if it is not advisable to use this treatment in acute cases, why should it be used in chronic cases, Dr. Hubbard was convinced that quite frequently more harm than good is done by the making of applications directly to the acutely inflamed

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mucous membrane, either of the nares, throat or trachea. As stated in the paper, tracheal injections of guaiacol and menthol oil solutions might advantageously be used instead of the ordinary stimulating expectorant mixtures, and certainly this class of expectorants were never indicated in the primary stage of acute bronchitis.

Paper.

OBSERVATIONS ON THE THERAPEUTIC VALUE OF MEDICATED OINTMENTS IN CERTAIN AFFECTIONS OF THE NASAL CHAMBERS.

BY ALEXANDER W. MAC COY, M.D.

MEDICATION of the nasal chambers by medicinal substances has incited the interest of all rhinologists since the beginning of the specialty. The employment of medical treatment in affections of the nasal chambers in the form of watery solutions and sprays and powders and vapors is our common knowledge. To attempt to discourse on such matters would not only appear trite, but would subject one to the criticism of "bringing coals to Newcastle." In asking attention to the consideration of the use of medicaments in the form of *soft* ointments, in diseases of the nose, I hope to avoid criticism, thinking that such *form* of medication may not be in common practice as a system and that it may not appear to be lacking in freshness of interest.

The employment of ointments has been my practice for upwards of twenty years. Each succeeding year has increased my respect for them and extended their field of usefulness.

The selection of a proper base in which remedies could be incorporated was not a difficult problem. The various petroleum bases were found available, and appear to meet all necessary indications. Petroleum bases are in a class by themselves, and have no just competitors in any other bases made from animal or vegetable substances. Petroleum bases, being non-oxidizable and easily sterile, and readily rendered softer and softer by proper compounding, appealed to me in many ways, and have been my choice in the various and varied combinations with drugs which in my judgment appeared useful and curative.

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The employment of ointments in the case of diseases of the nasal passages is confined to cases strictly *non-surgical* and in cases following surgical procedures, when the case is again relegated to *medical* medication. The choice of drugs must be left to the individual selection, and, as in solutions, etc., the preference will greatly vary, my contention applies primarily to the *form* of medication and to their availability.

The *form* of ointments is especially available for medication of the nose, if we reduce the consistency of the petrolatum to a very soft and semi-fluid product. The solubility of drugs in a petroleum base varies greatly, but much greater amount may be incorporated by suspension or mixture. The emollient properties of ointments, their grateful impressions on the nasal mucous membrane and their wonderful power of distribution over the tissues, together with their continued therapeutic effect, suggest their extended employment.

Their *availability* and great convenience make a strong claim for their employment by the patient. As ordinarily dispensed by the pharmacist in jars, etc., and with the ordinary consistence of petroleum jelly, ointments are not available nor are they convenient. Putting up in collapsible tin tubes makes them not only convenient, but permits of the jelly being reduced to a soft consistence by the addition of sufficient fluid petroleum to render their use very efficient.

Ointments dispensed in tubes are most convenient for the patient, and, as the supplementary assistance, for their medical adviser in the interim of visits to him. They are so conveniently carried to business or home that the interval of visits to one's office is usefully employed and the progress of the case is decidedly advanced. The effect of office care can be kept up, and in this respect shows a marked superiority over washes, sprays and nebulization, etc. The convenience of this manner and form of personal treatment has strongly appealed to me for many years. If we consider the utter inefficiency of the usual manner of employing sprays and nebulizers by the patient, we can, I think, realize the great superiority of soft ointments dispensed as above mentioned. During the winter months the employment of ointments appears to meet the artificial environment of home living and the vicissitudes of our climatic variations.

I have largely substituted the use of nasal washes, sprays and

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powders for home treatment by the prescribing of ointments, varied greatly, of course, according to the individual requirements and the local needs of each patient.

My experience taught me that frequent washings in most cases were harmful, caused much congestion of membrane, and rendered the nasal chambers much more sensitive. Since the employment of soft ointments during the winter season, I have found relapses much less frequent while patients are undergoing treatment for chronic conditions.

In the case of acute rhinitis, the medicated ointment can be so formulated that the relief afforded to all of the annoying symptoms is most grateful and satisfactory. The prescribing of medicaments in this form in acute rhinitis has been a distinct advance.

In many conditions in which it is necessary and urgent that cleansing solutions be first used, a continuous medication can be maintained during the interval of visits. After operations for outgrowths, deviations of the septum and cauterization, after a proper lapse of time, the healing process is greatly hastened by the employment of ointments. In cases of eczema of the nasal vestibules and lip and crust formations, the institution of an ointment promptly cures the conditions.

It is needless to mention the individual drugs rendered useful in the form of ointments. The same class of medicines generally employed in washes, vapors and powder for the relief of nasal conditions is selected, the difference shown being in their enhanced value in offering desired results. If I should mention calomel as a valuable remedy in many cases of hyperplasia it might be an exception, for so far as I am aware, calomel is not commonly employed for such conditions. Quinine is another drug locally used in ointment form which I have used with profit, in chronic rhinitis especially, where much excitability was present, and in the edematous condition present in naso-motor cases. Quinine, I imagine, is not used locally by many rhinologists.

SUMMARY.

1. That notwithstanding our bent of mind towards surgical procedures for the relief of diseases of the nasal chambers, the rational employment of drugs must still occupy our attention.

2. That our constant and persistent use of nasal washes, espe-

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cially during the winter season in our climate, tends to harmful results.

3. That by the employment of curative medicaments in the form of soft ointments in the nasal chambers, we can avoid certain risks following the use of washes, etc., and at the same time further the advancement of our patients toward a speedier cure.

4. That the availability, convenience and adaptability of medicated unguents in the therapeutics of the nasal chambers appeal in a rational manner for their employment.

5. That ointments prescribed should be dispensed in collapsible tin tubes as a protection from contamination, and because this form of dispensing renders them most convenient for use at all times and in all places.

Discussion.

Dr. H. L. SWAIN was much interested in this paper, because he had been frequently guilty of using ointments in the nose for one reason or another. With regard to the different drugs and their chemical affinity, he states that he often prescribed the yellow acid ointment and found that in patients who happened to be taking at the same time potassium iodide there resulted a chemical combination of the drugs, with a very vicious reaction. He did not remember ever having seen this fact stated in print, and thought his own ignorance of it had caused considerable trouble to his patients. He had made use of this same chemical affinity in getting a reaction in certain cases where there was sluggish ulceration. He believed there was a definite field for the use of preparations containing oil in one or another form in the treatment of the acute affections of the nose.

Dr. C. C. RICE understood in this connection that compressible tubes were used, but failed to see how thereby applications were made to the entire mucous membrane. He desired to be enlightened on this point.

Dr. J. SOLIS COHEN suggested the use of what is known as a "striping pencil." The ointment is smeared along the end of this pencil and it is then pushed backward until it reaches the pharynx and then brought forward and out with a rotary motion, thus covering the entire mucous membrane. These pencils are about an inch long, and are used for painting the stripes in carriage wheels.

Dr. W. K. SIMPSON had experienced difficulty in applying ointments of sufficient density. If some method of doing this could be formulated he would consider medication by ointments an ideal type of treatment.

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Dr. G. HUDSON MAKUEN called attention to a possible danger in the use of ointments. He referred to a patient of his who had for the last eight or ten years applied vaseline to his nose before retiring in order to insure sleep, as otherwise his nose became so dry that it kept him awake.

Dr. MACCOY first mentioned the various ways in which ointments put up in tubes might be applied. He had one patient who simply removed the cap from the tube and squirted the ointment up his nose, and although this was entirely foreign to Dr. MacCoy's method of application, he could see no reason why it *might* not be applied in this manner, but sterilization would be impaired. He found the ordinary ointment of vaseline, such as that purchased in the shops, to be too thick and firm for use, it being necessary to dilute it. In order to make it fit for use one or two drams of fluid vaseline should be incorporated in one ounce of the ointment.

With regard to the *form* of application it was considered that the less irksome this is made for patients the more apt they are to continue the treatment. He had advised applying the ointment upon cotton brushes, made with matches and toothpicks. These could be carried in small boxes in the pocket and were available for business, traveling, etc. They were, of course, only used once. Dr. MacCoy never used strong or severe ointments on account of the irritation produced, all the ointments being mild in character.

ESOPHAGOSCOPY AND BRONCHOSCOPY (KILLIAN'S OPERATION: TWO CASES).

BY E. FLETCHER INGALS, M.D.

ESOPHAGOSCOPY has been practiced so long and is so familiar to some general surgeons as well as to laryngologists, that its history would not be of great interest to this Association; however, its great value in some cases calls for at least a word, and I wish to present the history of one very interesting case in which it enabled me to make a successful operation where other methods failed.

Bronchoscopy is of more recent origin, and must become of great interest to laryngologists because of the aid that it affords

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in removing foreign bodies from the air passages, especially in cases that cannot be relieved by tracheotomy alone, and also in many other cases where the resulting scar and the dangers of pneumonia render the latter operation objectionable.

The ease with which foreign bodies can usually be removed from the trachea, and often from a main bronchus after tracheotomy, makes this latter operation preferable in most cases, but when the diagnosis is in doubt or when the foreign body has passed into one of the divisions of a bronchus, bronchoscopy affords a means not only of diagnosis, but of successful operation, infinitely superior to trans-thoracic bronchotomy.

We are greatly indebted to Prof. Gustav Killian, of Freiburg, i.B., Germany, who first demonstrated the practicability of bronchoscopy, and whose paper read to the British Medical Association, August, 1902 (*Journal of Laryngology, Rhinology and Otology,* September, 1902) first brought us to a realization of the capabilities of esophagoscopy and bronchoscopy.

Bougies may pass foreign bodies in the esophagus without touching them, and sometimes the radiograph will not show objects because of their character, or because they are hidden by the shadow of the vertebræ. On this account Killian says: "Direct esophagoscopy is the only absolutely reliable method."

In a recent article (*Archives of Laryngology and Rhinology*), Eicken states that Desormeaux first perfected the principle in the urethroscope, 1853. Killian states in his article that Kussmaul attempted esophagoscopy in 1868, but that the operation has been developed and perfected by v. Mikulicz, v. Hacker, Rosenheim, and others, and that many foreign bodies have been removed by this method; however, "If the foreign body is large, has sharp edges, points, or hooks, as for instance dental plates, all attempts at extraction are dangerous; these may easily lead to fatal injuries of the gullet. In such cases esophagotomy is indicated, if the foreign body is situated no deeper than 24 to 26 centimeters from the upper incisors (v. Hacker); if deeper, gastrotomy or posterior mediastinotomy (Enderlin) is called for. An exception may be made in the case of vulcanite plates without large metallic parts." Killian also specially recommends direct laryngoscopy through a straight tube for detecting and removing foreign bodies from the larynx in children. He says: "In children insurmountable difficulties often arise (to ordinary

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laryngoscopy). In these cases direct laryngoscopy (Kirstein's autoscopy) can always be successfully employed, especially after administration of an anesthetic, the patient's head being in a dependent position. Of course, if there is much dyspnea a preliminary tracheotomy must be performed." He says that a similar procedure is even more valuable for foreign bodies in the trachea.

When foreign bodies have passed deeply, beyond the main bronchi, bronchoscopy renders the greatest possible service, for the reason that we may thus locate and accurately grasp substances heretofore beyond our reach. Killian says: "We may, without fear, press the bronchi, which are highly elastic tubes embedded in soft tissue, into the median line, and bring trachea, larger bronchus and branch into one straight line."

I procured a set of Killian's instruments soon after reading his article, and have attempted their use for diagnosis in two esophageal cases, for removal of foreign bodies in the esophagus in two cases, for removal of foreign bodies from the air passages in two cases. In the cases for diagnosis, the first was satisfactory, but in the next, where a pin had been swallowed and had apparently passed into the stomach, the profuse secretions prevented a satisfactory examination. Of the next two cases, in one I made three or four efforts to introduce the esophagoscope, but had to quickly abandon it, because the child could not tolerate chloroform; the other was successful, and in one of the last two I did not use the instrument at all, because the electric light failed before the operation was begun, and I then removed the foreign body by tracheotomy; but in two most difficult cases, one of esophagoscopy and one of bronchoscopy, the operation proved entirely successful where the ordinary surgical procedures completely failed. In the esophagoscopy I used Kirstein's lamp as a means of illumination, as recommened by Killian, but in the bronchoscopy, although I tried this lamp, I obtained much more satisfactory illumination with the Chicago Electro-Appliance Co.'s No. 1 lamp, the same as their cystoscopic lamp, excepting that it was placed on a longer carrier that I had made for the purpose.

In the article published by Killian, September, 1902, he states that bronchoscopy had up to that time been attempted in 20 cases, in 5 of which it proved a failure. Eleven of these cases were his own. He refers also to cases by Coolidge of Boston, von Schroetter, Wild of Zurich, J. A. Killian of Worms, Hajek,

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Eicken of Bruns, Neumeyer, Spiers, Thost and Spiess. Since the publication of Killian's article, other cases have been reported, and the article just published by Eicken (*Archives of Laryngology and Rhinology*) brings the record down to the present time with the exception of two cases of lower bronchoscopy, one by A. Schwyzer of St. Paul, and one by Bodman, and my own case of upper bronchoscopy, a preliminary report of which recently appeared in the *Journal of the American Medical Association.* Eicken mentions the names of several others who have used bronchoscopy for diagnosis or more or less successful operations. Some of the cases were not published. In this list I find the names of Pienazek, Heryng, Schech, Schmidt of Odessa, Just and Brunner, making all told 34 cases, of which 19 resulted in successful removal of the foreign body, 10 by upper and 9 by lower bronchoscopy. Eicken's article is very complete, and should be read by everyone interested in the subject. In my search it is possible that some cases have been considered twice, but there appears, all told, to have been, up to May of this year, 14 successful cases of removal by lower bronchoscopy and 11 cases by upper bronchoscopy. Of the lower bronchoscopy, G. Killian has done 3, Coolidge 2, and Eicken, Neumeyer, Hajek, Spiess, Harrington, Wild and Lermoyez-Guisez, Bodmer and Schwyzer each 1. Of the upper bronchoscopy, Killian has done 5, H. von Schroetter 2, J. A. Killian 2, and Eicken and myself each 1.

Killian and most of the other operators use the Kirstein lamp as the source of illumination. In my operation I had the Kirstein lamp, indeed used it for a few minutes at the beginning of the operation, but in this particular case I obtained better results with the small lamp introduced to near the distal end of the bronchoscope. This was not at all in the way in searching for the foreign body, and it gave me no inconvenience in swabbing out the secretions, for an assistant removed it instantly and reintroduced it whenever I wished. One great advantage of this source of illumination is that the operation can be done in a light room, whereas with the Kirstein lamp it must be in a fairly dark room.

It is a great advantage to the anesthetist to have the room light in order to watch the patient, and it is much more convenient for the operator in handling his various instruments.

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The small light in the bronchoscope enables the operator to move his head at will without interfering with the illumination, and it enabled me to show the branches of the bronchi and the pin in position to all the physicians in the room. I did not find the lamp carrier any obstruction to the introduction of instruments, for although it took a little room, this interference was more than compensated for by the better illumination. In examining branches of the bronchi too small for passage of the bronchoscope, one of these tiny lamps on a longer carrier might be passed directly into the bronchus. From my limited experience and from numerous experiments I have made with the bronchoscope, it appears to me that even with the Kirstein lamp, which leaves the whole lumen of the bronchoscope available for instrumentation, it will very rarely be possible to grasp the object while actually under inspection, for the head must be moved to allow introduction of instruments, and the instruments themselves cut off a large part of the illuminating rays. These, I think, generally compel the operator to locate the object and then introduce his forceps in the right position and to the proper depth, and close them in the dark. Fortunately this can be done with almost as much accuracy as under actual inspection. In removing the fleur de lis chatelaine pin from the esophagus, I tried for a long time to catch it under direct inspection, but the necessity of moving my head to introduce the forceps and the cutting off of the rays of light by the forceps themselves, appeared to make this impossible, so that I at length removed the esophagoscope and attempted to reach the foreign body with various esophageal forceps, but owing to the edema of the esophagus, its wall appeared to fold over the foreign body, and I could not even feel it with an instrument. I then re-introduced the esophagoscope and having accurately located the body at the end of the tube passed in the forceps to the right depth, with the blades in the proper position and without seeing the body at the time, caught it easily. In removing the pin from the bronchus with the small lamp, down within a centimeter of the end of the bronchoscope, I was once able to see the pin at the instant I caught it; but this certainly cannot be necessary in most cases if the operator is thoroughly familiar with the location of the body and the relations of the forceps. In the case of esophagoscopy in which the secretions were so profuse, I used a local anesthetic only. I obtained a good

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view of the upper part of the esophagus, but not of the lower. I then resorted to a horse-hair extraction, which seemed to demonstrate that the pin was not in the esophagus.

In the bronchoscopy the parts were also anesthetized by cocaine, and bleeding and probably secretion were somewhat checked by suprarenalin. In the bronchoscopy the operation was much facilitated by the vise-like grip with which Dr. Corwin held the patient's head in any position I desired; and I think also by the sixtieth of a grain of atropin which I had given hypodermically before the anesthetic was begun, for the purpose of checking secretion. In the latter operation the patient did not breathe well for a time, but after the bronchoscope had passed into the bronchus there was no difficulty, although two or three times she appeared not to be breathing at all, when really she was respiring easily. At these times the advantages of a lighted room were great, for otherwise the operation would have been suspended. The employment of a chloroform inhaler that permitted us to introduce the vapor through a small tube was also a great convenience.

During the search for the pin, although I had on glasses, I was much annoyed by the vapor of chloroform being blown into my eye and causing much smarting. This I have since avoided, by having an assistant hold a pane of glass between the eye and the end of the bronchoscope; this has also been very serviceable in preventing the patient from coughing into the operator's eye. In both of these operations it was impossible to extract the foreign body through the tube, therefore after it had been seized and drawn firmly against the end of the instrument, it was held there and both were removed together. In both of these cases the radiograph was of signal service in furnishing information as to the location and position of the foreign body. In view of the interference in respiration by the unaffected lung, when the bronchoscope is passed into one of the main bronchi, Killian had a large oval opening made in some of his bronchoscopes some distance above the end. To meet this indication I have had a number of holes, each 2 x 4 mm., made in my bronchoscope from 5 to 10 cm. above its distal end. I can see no objection to these, and I find that they overcome the difficulty fully, without in any way interfering with the use of the instrument.

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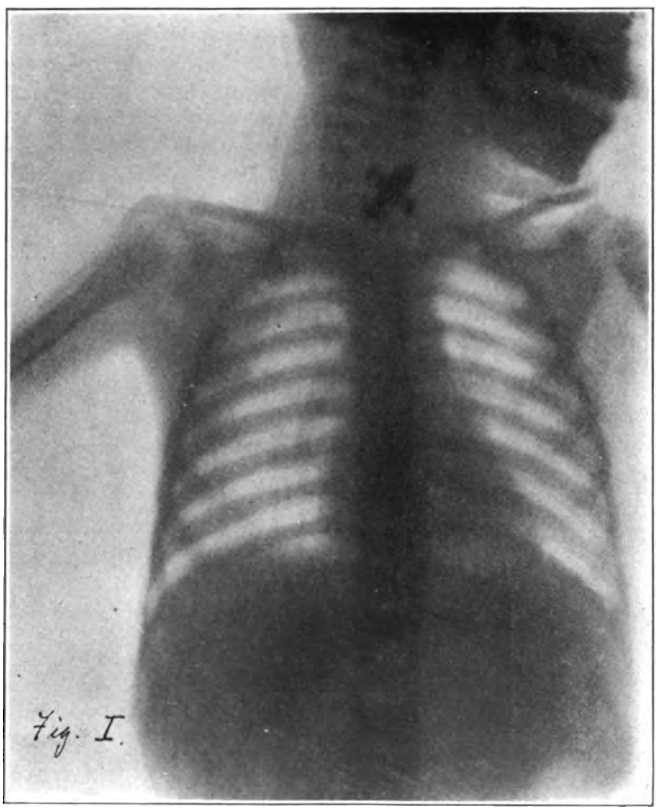
ESOPHAGOSCOPY.

CASE I.—On April 11, 1903, I received word from the Presbyterian Hospital that a child, H. C., had come in that had a foreign body in the esophagus. I had the child brought to my office, and then I learned from the mother that a radiogram had been taken at the hospital which showed the foreign body located at the narrow part of the esophagus, just above the interclavic-



ular notch, but she did not have the picture. The little girl was two and one-half years of age. Six days previously she had swallowed a fleur de lis chatelaine pin and had suffered severe nausea for several hours, and since that time had been unable to swallow solid foods. I found her pale and weak, but fairly well nourished. With the fluoroscope I searched some time before I could see the shadow of the foreign body, and but for the positive statement that the radiogram showed it I should have

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believed these was nothing there; but finally I made out the very faint, but distinct, outlines, as shown in the radiogram, Fig. I. I gave the patient chloroform, and then, darkening the room, introduced Killian's esophagoscope, illuminated by Kirstein's lamp. The secretions in the esophagus were quite abundant, but I swabbed them out with absorbent cotton on Killian's cotton carriers and soon discovered a small part of the pin in the folds of the collapsed esophagus at the end of the tube. I made many efforts to seize it with Killian's tube forceps under direct inspection, but this proved to be impossible, as I could not introduce the forceps without moving my head, and when they were in, on account of their length, I could not get my head near enough to the esophagoscope to throw in sufficient light

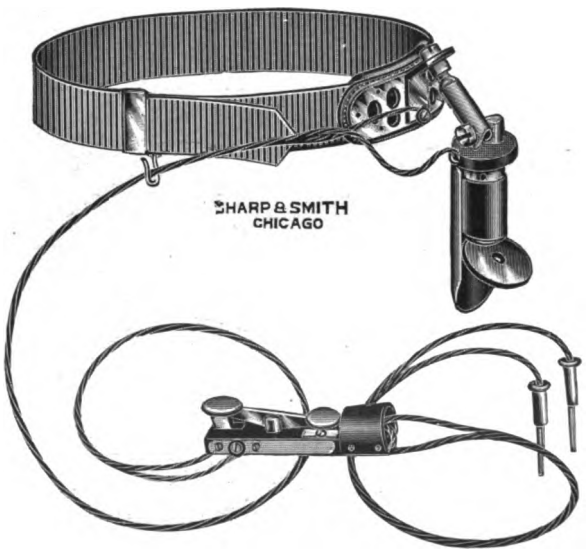

Fig. II. Kirstein's lamp.

to enable me to see the object. I tried to overcome this difficulty by springing the forceps and finally by bending them, but did not succeed. After about half an hour spent in these futile efforts I removed the esophagoscope and tried to catch the foreign body with the ordinary long bent, and also tube forceps, but I could not even feel it with either of these. I then re-introduced the esophagoscope, and having exposed a part of the pin, introduced the forceps with the blades in the right position to grasp it. I pushed them down gently about a centimeter below the end of the tube, and on closing them found that I had the pin firmly in my grasp. It was much too large to be extracted through the tube, so I drew them both out together.

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Whatever injury may have resulted to the esophagus from this procedure was speedily recovered from, and the patient was discharged cured in four or five days.

BRONCHOSCOPY.—REMOVAL OF PIN FROM LUNG.

CASE II.—Miss B. E., age 17, came under my care March 23, 1904, with the history of having drawn a large glass-headed pin into the air passages eleven months previously. She had attacks of cough for three days after the accident, but for the following month the symptoms were so slight that her friends could not believe she had inhaled the pin. Afterward the cough gradually grew worse, so that in six months she had to leave school, and finally became so bad that, as she said, she was like a person in the "last stages of consumption." At times she could feel the pin move about in the air passages, and one time it was coughed up to the larynx and caused a spasm that nearly proved fatal. Her sensations had always been referred to the right side or to the centre of the sternum. She was short of breath, particularly when lying down at night. She at times expectorated a great deal for four or five hours at a time, and frequently the sputum contained some blood. The X-ray was used

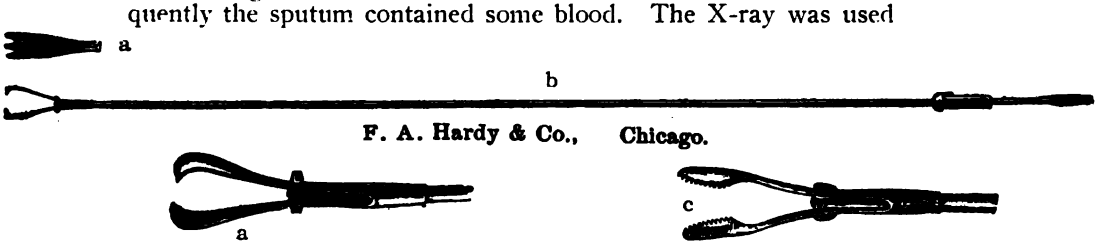

Fig. 3. Killian's tube forceps.
a. Sharp tooth, natural size.
b. Stem 45 cm. in length.
c. Safe forceps, natural size.

three times, but nothing could be discovered. In the latter part of January she had been sick in bed with considerable fever, and after about two weeks (on the 6th of February) Dr. Allison, of her home town, had opened the trachea and sought for the pin, but being unable to find it, had closed the wound, which healed promptly. The patient stated that an abscess had been found at the time of the operation, and that there was considerable expectoration of pus. Subsequently she had very little cough, until she took a cold about two weeks later. At the time I first saw the patient the scar from the tracheotomy caused a raised welt, which was very sensitive to the touch, and she was having more or less pain, severe on coughing, the principal seat of which was beneath the third right costal cartilage; the pain

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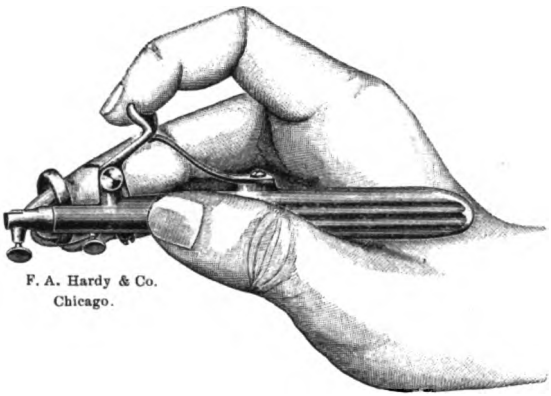

Fig. 3. Handle for Killian's tube forceps.

extended from the second to the fourth ribs, and from the middle of the sternum about 9 cm. to the right. The patient, who was large and tall for her age, I found fairly well nourished; usually weighed 120 pounds, although she had lost considerable flesh; the pulse was 90, temperature normal and appetite and digestion good. She was coughing a good deal and expectorating from three to six ounces of muco-pus daily. The nares and throat were negative, but at the site of the tracheotomy there was a granulation tumor in the trachea about 7 mm. in diameter. I

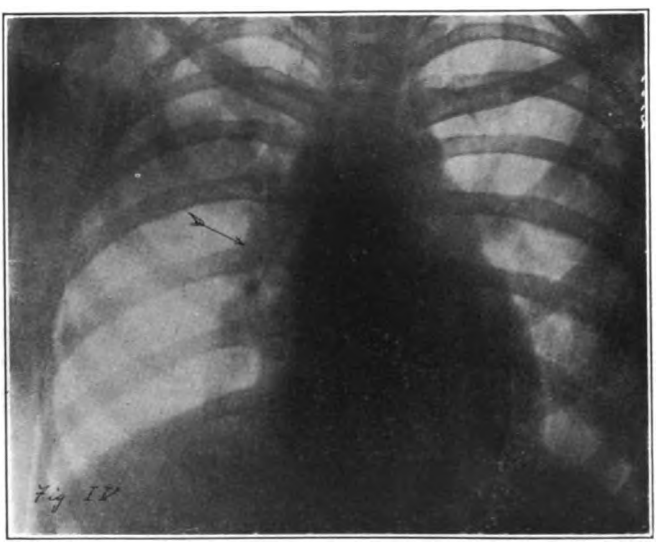

Fig. IV.

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could not see the lower half of the trachea. There were a few feeble râles and slight feebleness of the respiratory murmur at the inner part of the lower lobe of the right lung. Otherwise physical signs were normal. A radiograph taken at the hospital showed the pin, Fig. IV, located on a line between the second and third ribs in front and the fifth rib and sixth interspace behind, and from 3 to 4½ cm. to the right of the median line, with the head directed downward and outward. At 5:30 P.M. March 24th, assisted by Dr. George H. Kennett, who gave the chloroform, and Drs. A. M. Corwin, O. T. Freer, N. P. Colwell and E. L. Kenyon, I operated with Killian's bronchoscope, 35 cm. in length and 9 mm. in diameter. I first gave the patient gr. 1-60 of atropin hypodermically to check secretion, then administered chloroform through a Brophy inhaler, Fig. VI, by which the

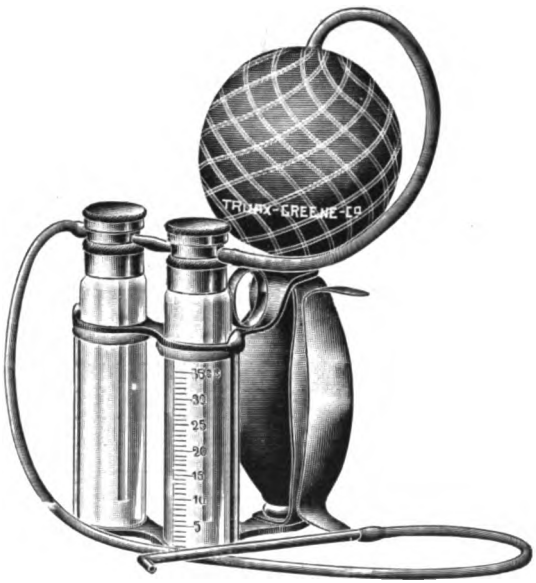

Fig. VI. Brophy's inhaler.

vapor is blown through a small tube. During the operation the vapor was administered through the bronchoscope. The patient was drawn up so that her head hung over the end of the table, where it was held by Dr. Corwin. I was seated directly back of her head. With a modified Kirstein spatula the tongue was pressed forward and the bronchoscope introduced; but first I got it into the esophagus. After passing the narrow portion of the esophagus, where the wall of the gullet folds down closely over the end of the bronchoscope, the esophagus was more or less open, showing an open tube for several centimeters below the

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end of the instrument. This was at first confusing. The walls of the esophagus under these conditions expand and contract with respiration, but they do not entirely close. I withdrew the bronchoscope and with my finger directed it into the larynx as I would an intubation tube, a plan that is easier for me than under inspection. When the patient was nearly under the chloroform I sprayed into the larynx a moderate quantity of the following solution, which was also used later several times to anesthetize the bronchi and thus permit of a smaller amount of chloroform. Three or four times during the operation the patient breathed poorly.

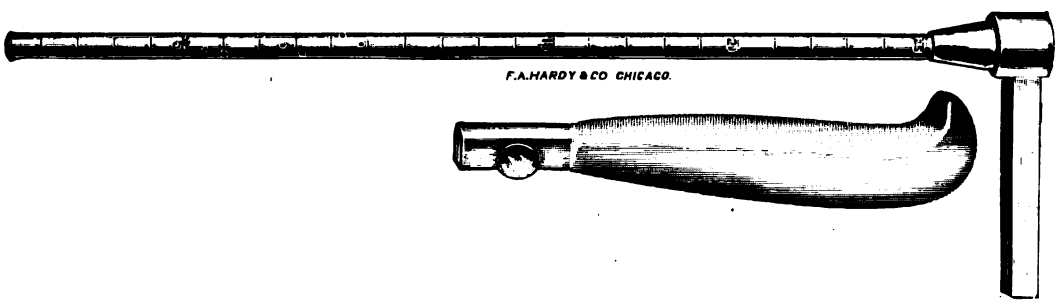

Fig. V. Killian's bronchoscope and handle.

Suprarenalin	gr. $^1/_8$
Atropin	gr. $^1/_{10}$
Strophanthin	gr. $^1/_5$
Ol. Caryophili	M. iii
Acid Carbolici	gr. x
Cocaine Hydrochlorate	gr. xlviii
Aq. dist. ad.	f. oz i

Turning the patient's head to the left, I readily passed the bronchoscope into the right main bronchus and examined its various branches, removing the secretions from time to time with a pledget of cotton carried in by a long cotton carrier. At the beginning of the operation I used a Kirstein lamp, but later substituted the small lamp of which I have already spoken. The light from the latter at first caused confusing reflections because of its brightness, and I could not regulate it accurately by the battery as could have been done by a rheostat; but the lamp at length became partly dimmed by a thin coating of blood, which was a material benefit. Although I could easily see all the main bronchus and its branches running downward and outward, I could not find the pin, though I searched for it a long time. At length I took a blunt hooklet furnished with the set (Fig. VIII).

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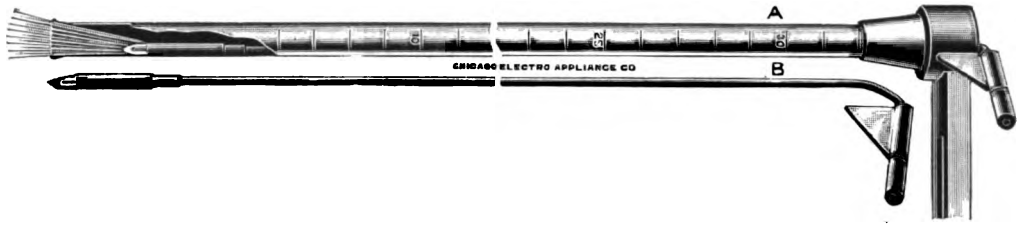

Fig. VII. Chicago Electro Appliance Co.'s No. 1 lamp.

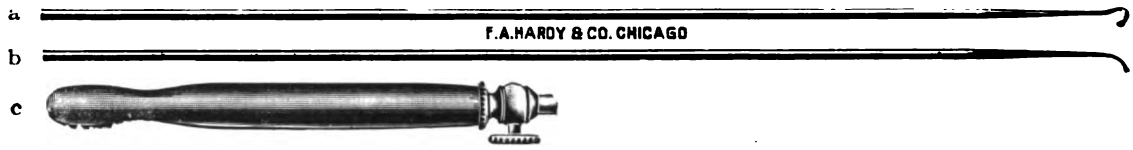

Fig. VIII. Hooklets. a. For removal of foreign bodies, but not safe for introduction into small bronchi because of danger of becoming caught in some lateral branch. b. For searching safely in bronchi for foreign bodies. The hooklets are nearly natural size, but the stems are 45 cm. in length. c. Removable handle, ½ size.

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and after sweeping it about the various bronchi for several minutes, finally brought a part of the pin across the end of the instrument. I was unable to see either the head or the point of the pin and I concluded that the head must have passed backward into a bronchus, the opening of which was not visible. Feeling confident that I would not lose the pin, I demonstrated it to Prof. Senn and various other physicians who were present, and then seized it with Killian's tube forceps, Fig. III, and by manipulating the forceps and bronchoscope tried to bring the point of the pin into the tube. I let go of the pin and seized it again several times in this effort, but found it impossible; at length, concluding that the point was sticking into the wall of the bronchus, I finally determined that it would be better to scratch the air tubes all the way up than to take further risks of losing the pin again; therefore I seized it firmly and drew pin and bronchoscope out together. I found that the pin had been grasped near the head, and it came out bent. In grasping the pin I did not actually see the blades close on it only once, for the forceps when opened shut off the field of vision. By measuring off the length of the bronchoscope on the forceps and marking this with a rubber strap about the forceps I could readily tell how far to introduce them before closing the blades, and by a knowledge of the position of the pin the blades could be turned in the proper direction. The operation took, all told, an hour and a half. At 9 P.M. the pulse was 90, at 3 next morning 78, and at 8 A.M. the pulse, temperature and respiration were normal. There was no temperature afterward. The tongue where it had been hurt by the tongue forceps was sore and the bronchi were sore, but this had all disappeared in a couple of days. Four days after the operation the patient went home feeling well excepting a little cough, which soon disappeared. I examined the trachea just before she went home and found that the granuloma had been rubbed off during the operation. On May 12 she wrote me that she was perfectly well, had gained several pounds, weighed 122, and was in better health than before the accident.

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FOUR CASES OF FOREIGN BODY IN A BRONCHUS.

BY A. COOLIDGE, JR., M.D.

FIVE years ago in Chicago I read before this Association the report of a case in which I had removed a broken tracheotomy tube from the right bronchus by means of a straight speculum through the tracheal wound.[1]

Although before this time Killian had introduced straight tubes not only through a tracheal opening but also through the natural passages, the subject of bronchoscopy was a new one, and had only a few times been applied to the extraction of foreign bodies. As indicated in the discussion on my paper, it was often considered wise to let a foreign body remain in a bronchus rather than to attempt to remove it. I think that it now would be an exceptional case in which a surgeon would advise waiting. This difference in the relative dangers of operating and of delay is due wholly to the knowledge of the fact that the bronchi can be explored through straight tubes easily and with comparatively little danger to the patient.[2]

During the last five years a large number of cases have been reported, and a goodly number of papers on the subject have appeared in our journals. For a review of this work I cannot do better than simply refer to a recent monograph by von Eicken,[3] first assistant in Killian's clinic in Freiburg.

Since reading my paper I have removed a foreign body from a bronchus in four cases, three after tracheotomy, and one with the aid of Killian's bronchoscope through the natural passages. Although I have little to add to my previous report, I will supplement it by briefly describing these cases.

CASE I.—(This case has been briefly reported, *Boston Medical and Surgical Journal,* April 10, 1902, and is quoted by von Eichen.)

[1] *New York Medical Journal,* Sept. 30, 1899.
[2] Wood: *Philadelphia Monthly Medical Journal,* Sept. 30, 1899.
[3] *Archiv. fur Laryngologie,* 15 Bd. 3 Heft.

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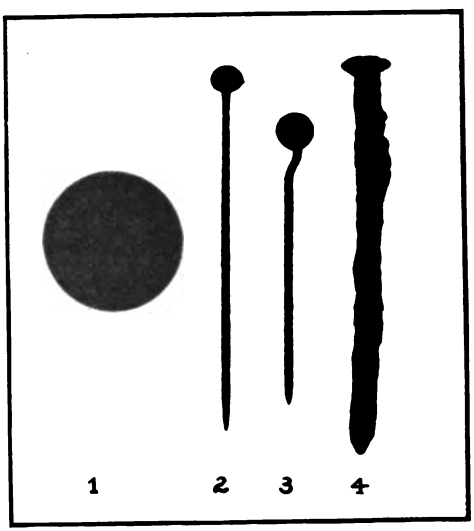
Edward B., age 35, admitted to the Massachusetts General Hospital, service of Dr. Warren, Dec. 24, 1900. Two days previously he had lost a silver dime in his nose, which had thence fallen into the trachea. A low tracheotomy had been done before admission, but attempts to seize the coin had then been unsuccessful. There were no symptoms of discomfort in breathing. X-ray showed a foreign body just to the right of the median line at the fifth costo-vertebral articulation.

With the patient on his back, without a general anesthetic, a straight speculum 3½ inches long and 7-16 inch in diameter was introduced through the tracheal wound and pushed down nearly



The four foreign bodies, actual size.

to the bifurcation. The coin was seen in the upper part of the right bronchus and removed with alligator forceps. The illumination was by a head mirror and reflected light.

December 29—Patient discharged well.

CASE II.—Nettie H., age 22 months, entered the hospital April 21, 1902, in the service of Dr. M. H. Richardson. Twelve days before admission, after being left alone the child was found choking and cyanosed. Soon recovered, but has had frequent attacks of choking and coughing, with perfectly normal intervals.

On admission nothing abnormal was found on percussion or auscultation. Respiration was normal, except for occasional spasmodic cough. The X-ray showed a shawlpin, head down, apparently in the right bronchus.

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April 24—The trachea was opened by Dr. Richardson below the isthmus of the thyroid. The tracheal speculum was introduced, pushed into the right bronchus until the point of the pin entered the tube, when it was seized with alligator forceps and removed. Illumination by head mirror and reflected light. The pin was 1⅞ inches long, with a head 3-16 of an inch in diameter.

May 13—Patient left the hospital well, and has remained well to the present time.

CASE III.—Miss Lena G., age 24, entered the hospital March 21, 1904, in my service. The day before, while holding a pin 1½ inches long with a large blue head between her teeth, a friend startled her and she inhaled the pin. At first there were absolutely no symptoms. Thinking she had swallowed it she excited vomiting, when she began to have a pain through the centre of the chest, with cough and a little bloody expectoration. The pain continued through the night and then disappeared, except a little in the left fourth interspace on coughing.

On admission the X-ray showed a pin with the point at the fourth interspace on the left side, and the head directly below it. A lateral view showed it about one inch from the vertebral column. Under ether anesthesia I opened the trachea, introduced Killian's bronchoscope and pushed it into the left bronchus. I did not have an attachment for maintaining respiration in the right bronchus. The foreign body could not be seen and the bronchoscope was removed, as the patient stopped breathing. It was necessary to do artificial respiration for a minute or two before normal respiration was established. This was repeated, and in consequence a tracheotomy tube was put in and the patient sent to the ward.

The next day the X-ray showed the pin in the same place. On the third day, without a general anesthetic, the trachea was sprayed with cocaine and the short tube inserted through the wound. The pin had in the meantime become dislodged and was seen high up in the left bronchus and was removed easily. The illumination was by Killian's electric head light.

March 31—Patient discharged well.

CASE IV.—Robert D., age 8, entered the hospital May 12, 1904, in the service of Dr. A. T. Cabot. In June, 1903, the patient said that he had swallowed a nail, but this was not believed Within a few days he developed a right-sided bronchitis, which, although better, has persisted since. He also had slight periodic asthmatic attacks on exertion, but these have disappeared in the last three months. Recently, on account of the localized bronchitis, the story of the nail was remembered and an examination with the X-ray showed a foreign body, apparently in the right bronchus.

The patient was given 1-300 grain atropine subcutaneously and etherized. He was placed on a table on his back, with his head

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hanging over the end. With Kirstein's autoscope the interior of the larynx was brought into view and cocainized with a one per cent. spray. I then introduced Killian's bronchoscope (20 cm. long, 8 mm. in diameter) without difficulty and pushed it down the trachea, using cocaine spray through the tube. The nail was readily seen projecting from the right bronchus into the trachea, with the point imbedded in the tracheal wall. When the nail was touched with cotton to clear the field or with Killian's forceps coughing was excited and a little bleeding. After two or three attempts the nail was freed from its impacted position, and although it slipped from the forceps it followed the tube as it was withdrawn through the glottis and was seized in the pharynx. The illumination was by reflected light. There was a little blood when the nail was first seized, which stopped immediately. The patient did not suffer in the least from the operation.

May 16—Patient discharged well, except for a few coarse râles on the right side, especially in the scapula region, the same condition as before the operation.

May 29—The child's father, who is a physician, reports that the patient is well and that no râles are to be heard.

From the experience of these cases I have but little to add to the conclusions presented with my first case. I am, if anything, more in favor of operative interference in cases of inspired foreign bodies than at that time, and inclined to attempt their removal through the natural passages in a larger number of cases. The latter demands that there be at hand not only the proper bronchoscope, but what is equally important, proper instruments for working through the tube after it is in place. For the lower operation almost any hollow tube of proper calibre, and long slender forceps, will carry the operator well into the primary bronchi. The introduction of the bronchoscope after previous tracheotomy presents no difficulties. A general anesthetic is not necessary nor advisable if a tracheal opening already exists, and in many cases the tracheotomy might well be done with cocaine. The reflex respiratory inhibition, which has been carefully studied by Crile, is sometimes annoying and may be serious. In my cases it appeared only under a general anesthetic, and did not occur after a subcutaneous injection of atropine and local application of cocaine, as recommended by Crile.[1]

In regard to the choice between the tracheal and natural passages, in the first two cases the absence of the proper instru-

[1] *Medical News*, Feb. 24, 1900.

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ments, or the presence of a tracheal opening, left no opportunity for choosing. In the third case a pin, point upwards, was shown by the X-ray to be at the bottom of the left primary bronchus, with the point at the fourth interspace, and the head an inch and a half lower. I did not think that I could succeed in reaching it through the mouth, and that an unsuccessful attempt to do so might harm the patient. In the fourth case the point of the nail was probably as high as the bifurcation, a typical case for an attempt by the natural passage. Bronchoscopy through the natural passages is, of course, not so very simple and easy as through the tracheal wall, but the introduction of the bronchoscope in this case presented no difficulty. The added difficulty was due to the smaller calibre and greater length of the tube. With Kirstein's autoscope the glottis was seen, and after spraying with one per cent. cocaine, the bronchoscope passed easily. It is, of course, a satisfaction to the patient and to the surgeon to avoid tracheotomy, and there is no doubt that tracheotomy is a source of danger in itself. An unsuccessful attempt through the natural passages followed by tracheotomy not only lengthens the operation, but it must add a little to the danger of sepsis. The mouth and pharynx cannot be made surgically clean, and it is difficult not to come in contact with them. This, I think, should be considered, especially when there is probable wounding of the trachea or bronchi, or where any circumstances are likely to prolong the search for or extraction of the foreign body.

Discussion on the Papers of Drs. Ingals and Coolidge.

Dr. J. W. GLEITSMANN in this connection spoke of his experience with Killian's bronchoscope and the difficulties attendant upon its use, and also made mention of the Kirstein light.

Dr. J. EDWIN RHODES mentioned a case reported in recent literature in which a pin was extracted similar to that removed by Dr. Ingals. This pin was easily removed from the third division of the bronchus through a tracheal opening.

Dr. W. K. SIMPSON reported the case of a girl of about 20 years of age who swallowed a safety pin. This lodged in the esophagus, and the X-ray showed it opened and turned with the point up, so that it was almost impossible to suggest any means for its removal. It was so caught that it could not be drawn out of the esophagus in any way except by opening this structure. The next day, however, when another X-ray picture was taken it was found that during the night the pin had become completely

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inverted; and it was therefore readily extracted under chloroform anesthesia. The case was mentioned in order to show the peculiarities which might take place as a result of movement.

Dr. JOHN O. ROE reported a case in which he removed a twenty-five cent piece from the esophagus of a child of 8 years. By means of the X-ray he determined the exact location of the coin, and extracted it with special forceps that had been devised by him. In extracting the coin the forceps was directed to it by the aid of the fluoroscope, and by which the location and movement of the forceps, as well as the coin, and when the coin was grasped by the forceps, could readily be seen.

Dr. INGALS, in closing the discussion, called attention to the fact that the esophagus is flattened from before backwards in its upper part so as to determine the position of flat objects, such as buttons and pennies, which lie in such a position that forceps must open antero-posteriorly in order to grasp them.

Dr. COOLIDGE, in closing, stated that if he had had the experience in connection with his third case which he had with his fourth, and if he had had the instruments on hand for maintaining respiration in the right bronchus while he invaded the left, he should have made an attempt to reach the foreign body through the natural passages before doing tracheotomy.

He agreed with Dr. Gleitsmann that Killian's autoscope is an instrument which might be used much oftener than it is. The introduction of the autoscope into the trachea of living subjects is even easier than in the cadaver, as the passages are more movable and better lubricated.

Paper.

THE EFFECTS OF TOBACCO UPON THE THROAT.

BY SAMUEL W. LANGMAID, M.D.

I HAVE been induced to write this short paper because my experience of the evil effects of tobacco on the throat, especially by smoking, has been contrary to what is generally taught in text-books, and because very little has been written on the subject and no record of clinical observations has come under my notice. The subject has generally been dismissed with an opinion for which no good reasons were offered.

For many years I have been compelled to believe that smoking is responsible for certain forms of throat disease, or is an added factor in the injurious effects of climate.

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I must acknowledge that my observations have been made in a cold, moist climate, such as exists in winter all along the seashore of the northern United States, and may not hold good in other warmer or warm-moist climates. Indeed, I am inclined to believe that such is the case. But should it be urged that climate alone might be considered responsible for the affections of the throat, I might reply that until tobacco is abandoned there is very little or greatly delayed response to treatment.

The condition of the throat which I have observed is that so exhaustively treated and so truly described by Bosworth in his chapters on acute naso-pharyngitis and naso-pharyngeal catarrh. Bosworth, however, although admitting that tobacco may be an irritant to the pharyngeal mucous membrane, says that he "has always considered the nicotine absorption to be the vicious factor in its use." He admits that the ammonical vapor and possibly the small quantity of pyroligenous acid may act as irritants and that it is frequently noticed that a patient suffering from naso-pharyngeal catarrh is greatly inconvenienced and his trouble even aggravated by smoking, and that in such cases it is necessary that the habit should be abandoned. But, he says, "the cases are the exception, rather than the rule." My belief is that in all cases of acute and chronic naso-pharyngitis smoking must be abandoned or the cure is delayed. Especially is this the case if cough is a prominent and distressing symptom.

DISEASES OF THE NOSE AND THROAT.

Although I believe that much of the hyperemia of the pharyngeal mucous membrane may be due to irritation of the smoke from the burning tobacco, I am forced to believe also that the poisonous effects upon the nervous system may be to a large extent responsible for the vasor-motor disturbances which are plainly visible in the throats of all smokers.

I believe that most of us could hardly make the mistake of not recognizing by the appearance of the throat the non-smoking man, even if he should not apply to us for treatment of a naso-pharyngitis. It has been my custom to make such a diagnosis, greatly to the astonishment of the patient. Furthermore, I think the appearance of the throats of most female patients will be

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noticed to be unlike that of men, even when the pharyngeal mucous membrane is acutely or chronically diseased.

I am inclined to believe that it is largely due to the poisonous action upon the nervous system that tobacco plays such a part, as it seems to me, in producing and perpetuating disease of the throat. The following extracts from recent articles on the action of excessive smoking upon the organs of special sense may seem to you to afford justification for such an assumption.

"POSSIBLE ETIOLOGICAL FACTOR IN TOBACCO—ALCOHOL AMBLYOPIA.

"G. E. de Schweinitz and Edsall (*Trans. Am. Opth. Soc.*, 1903) attempt to throw some light on what the possible poison may be which produces one or the other of the many changes which have been described by many authors in the optic nerve fibres, or the ganglion cells of the retina, and which manifest themselves by the clinical symptoms."

"Horner, long ago, and de Schweinitz, 1900, suggested that the disease depended on a species of auto-intoxication, and the investigations of Sachs and Casey Wood indicate 'that certain stomach toxins are capable of causing in animals blindness, probably of the type now under consideration.' In seven cases there were evidences of marked disturbance of digestion or metabolism, or of both."

TOBACCO NERVE DEAFNESS.

"Wyatt Wingrave (*Ann. of Otol., Rhinol. and Laryngol.*, Sept., 1903) gives the results of his observations of seventeen cases as follows: (1) That they were all well-marked cases of nerve deafness (unattributable to other causes), occurring in heavy smokers. (2) That the loss of low tones in 50 per cent. suggests an auditory equivalent for a recognizable ocular lesion. (3) That the disease was symmetrical. (4) That there was an impairment of color sense in eight of them, and definite scotoma in four cases. (5) That eighty per cent. showed marked improvement on abstinence from tobacco supplemented by drug treatment; three were cured."

TOBACCO SMOKING.

"Beside nicotine, tobacco smoke contains nicotianine, collidine and other pyridine derivatives, acids, resins, carbon dioxide, prussic acid, and ammoniacal salts. Two drops of nicotine placed on

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a dog's tongue produce in succession efforts to swallow, great weakness, convulsions, and death in less than a minute. Eight drops will kill a horse. Tobacco contains from two to eight per cent. of nicotine, and Le Bon has determined that though most of this is changed in smoking, it appears as other pyridine bodies which are just as poisonous."

"Petit (*Le Progres Medicale,* Nov. 28, 1903) finds that these bodies do not condense much in the warm mouth, so are mostly exhaled. Therefore, the physiological effect of ordinary smoking is not a marked one. Susceptible persons may, however, be much affected by breathing the air of a room in which there is much tobacco smoke."

THE POISONOUS CONSTITUENT OF TOBACCO SMOKE.

The gaseous products of the incomplete combustion of tobacco whether it be smoked in the pipe, cigarette, or the cigar, are so complex that the question, To which constituent are the toxic effects of tobacco smoking precisely due? remains unanswered. Of course, it is well known that nicotine is a powerfully poisonous constituent of tobacco leaf, but it is by no means certain that the alkaloid reaches the system by way of the smoke in sufficient quantities to act seriously as a poison. To begin with, the amount of nicotine in tobacco is very small, and there is reason for believing that the quantity given in previous analyses has been considerably over-presented; moreover, though a volatile poison, nicotine does not occur in the free state in tobacco, but as an organic salt, which is not volatile, and which probably breaks up readily on combustion. It is doubtful whether a seventh part of the total nicotine in the tobacco reaches the mouth of the smoker, and some investigators deny that any nicotine occurs in tobacco smoke at all. But assuming that nicotine is the toxic constituent of smoke, the quantity must be quite minute, since in most mild tobaccos the proportion is rarely over one per cent. On the other hand, the incomplete combustion of tobacco gives rise to the formation of aromatic compounds, oils, bases, amines, and gases, some of which are undoubtedly poisons, and these are obviously produced in a far larger amount compared with the quantity of nicotine in tobacco.

In this connection too little attention seems to have been paid to the relatively large quantity of the poisonous gas—carbon monoxide—in tobacco smoke. When the insidious nature of this gas is considered, its absorption in the system, which must be very

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rapid when inhalation is practiced, would sufficiently explain the train of poisonous symptoms which excessive smoking is apt to set up. In some particulars the physiological action of nicotine and carbon monoxide is similar. The dizziness and stupor, the trembling of the limbs and the hands, the disturbance of the nerve centres and of the circulation, palpitation on a slight effort, and the feeble pulse, may be the indications of either carbon monoxide or nicotine poisoning. But since one ounce of tobacco gives no less than one-fifth of a pint of pure carbon monoxide gas when smoked in the form of cigarettes—and probably as much more in the form of cigars or in pipes—it is not improbable that to a very large extent these symptoms are due to the carbon monoxide.

We have recently tried the following instructive experiment, which bears upon this point: Two or three mouthfuls of tobacco smoke from a cigarette were shaken up with a few drops of blood diluted with water in a bottle. Almost immediately the blood assumed the pink color characteristic of blood containing the gas, and further observations with the spectroscope confirmed the presence in the blood of carbon monoxide. Similarly a few mouthfuls of smoke from a pipe and a cigar were tried, and the results were even more marked. In this experiment we have some explanation in particular of the evil effects of cigarette smoking, for it is chiefly cigarette smoking that is inhaled—an indulgence by which the poisonous carbon monoxide is introduced directly into the blood. This effect of tobacco smoke upon the blood appears to be of considerable significance.—*Lancet,* Jan. 2, 1904.

The above statements seem to offer sufficient evidence of the poisonous action of excessive smoking upon the nervous system. The opthalmic and the aural surgeon have never doubted their effect upon the organs of special sense.

Clinical evidence is, to my mind, sufficient to prove similar action on the throat. The smoker is never quite free from a form of naso-pharyngitis and sooner or later a mild form of tracheitis appears and becomes chronic. The naso-pharyngitis may reveal itself by the necessity for frequent hemming, or, as frequently occurs, by a morning cough which in some cases is so severe as to cause vomiting, which is frequently ascribed to "catarrh of the stomach."

Not infrequently when the naso-pharyngitis becomes acute, as

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it frequently does in winter, a most distressing night cough appears, convulsive in its nature and resembling the constantly repeated cough of the child with naso-pharyngeal adenoma. The cause for such a cough is not suspected by physician or patient, and demulcent medicines having been found inefficacious, resort is had to opiates, with the result of destroying the patient's digestion, and the usual systemic disturbances follow.

I have frequently found that the cough would quickly disappear if smoking was discontinued, internal medication being limited to the giving of a placebo, but if the smoking was continued, or not materially lessened, the cough would continue, or, with intermissions, return during a period of months. But I would call attention especially to the effect of tobacco upon the throat and voice of singers.

I have refused for many years to treat the throats of singers and public speakers where smoking was not discontinued, since I believe that treatment which otherwise would be efficacious would be of little avail. The specialist is frequently consulted by a singer or actor for hoarseness which prevents a public appearance. The pharynx and larynx are hyperemic, the secretion of glutinous mucus is excessive, but the real reason for altered quality of voice, or its extinction, is found in the paresis of the intrinsic laryngeal muscles. Either or both vocal bands are relaxed and the upper register of the voice is lost. In such cases a few days or hours of rest of the voice and the treatment which any skilled specialist would apply would be sufficient to restore the voice to a working condition. But the patient must be told that unless he ceases to smoke relief will be delayed.

If it should be said that such a condition may result from over use of the voice or from climate, or both, I shall certainly agree but would yet maintain that smoking not only helps largely to provoke such attacks, but that it retards the restoration of the vocal ability.

I believe then that tobacco smoking is not only harmful to the throat as a direct irritant, but that it produces vaso-motor disturbances of the pharyngeal mucous membrane by its poisonous effects upon the nervous system.

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Discussion.

Dr. H. L. SWAIN referred to a rather amusing experience of his some three years ago. At this time a very genteel young lady consulted him for throat trouble, and after carefully examining her throat Dr. Swain informed the patient that if she were one of the students he would certainly say she had been smoking too much. The patient astonished him by replying that it might be due to that very thing, as she was addicted to smoking. She did not return for another visit until about two months ago, when Dr. Swain recognized her, and after again carefully examining her throat gave the same opinion as at first. The patient then informed him that she simply wanted to know how much effect her smoking during the intervening time, three years, had had upon her throat. Dr. Swain acknowledged that he could find no appreciable difference in the condition. The patient complained, however, of having less comfortable nights.

It was Dr. Swain's opinion that there is a certain mark left upon the throat by smoking, which he is often unable to describe clearly enough, for example, to demonstrate to a class of students.

Dr. J. W. FARLOW considered it the duty of laryngologists to instruct their patients who are unwilling to abandon smoking entirely as to the best way to smoke with a minimum of damage to the throat. He suggested that one, or even two cigars can, perhaps, be smoked without detriment, if smoked directly after the principal meal and only at that time. At least two hours should elapse between the last smoke and bedtime. The mouth should be thoroughly rinsed with cold water after smoking

Dr. LANGMAID, closing the discussion upon this subject, stated that one could be materially aided by stopping smoking for a time. He found this method of treatment to be productive of good results in many cases.

With regard to the effect of tobacco upon singers' voices, he had known several singers who have tried to smoke when the throat was affected, but who were obliged to give it up. He was willing to admit, however, that deep voices, such as baritone, bass or contralto, are not so easily affected by tobacco smoke as were the higher voices, viz., the tenor and soprano, since the beauty of tone in the lower-pitched voices does not depend, for reasons foreign to the scope of this paper, upon the absolute integrity of the vocal bands.

Dr. Langmaid stated that there were more female smokers than one would believe, and said that it is hardest for a woman to give up the habit when once acquired.

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REPORT OF A CASE OF PRIMARY LUPUS VULGARIS OF THE ORO-PHARYNX AND NASO-PHARYNX, TREATED BY X-RAYS.

BY H. S. BIRKETT, M.D.

PRIMARY lupus vulgaris of the pharynx and naso-pharynx is sufficiently rare to warrant one placing another such case on record, but especially when the means of treatment are new, and the results obtained satisfactory.

The following is a brief outline of the patient's history: L. T., a lad aged 15, consulted me at the Nose and Throat Department of the Royal Victoria Hospital in November, 1902. He complained at that time only of difficult nasal respiration, which condition has existed, as far as he knew, for three or four months, but has become especially marked within the past two weeks. The lad is robust-looking and apparently in good health; his intelligence, however, seems rather below the average. He has always lived on a farm and been accustomed to outdoor life. His health from infancy up to the time of the onset of his present illness has always been good.

Regarding the family history, one brother and three paternal uncles have died of pulmonary tuberculosis. One striking feature in connection with this case is that the patient occupied the room in which his brother died.

The lymphatic glands in the anterior triangles of the neck are felt to be distinctly enlarged. Examination of the heart and lungs reveals absolutely nothing abnormal, and there is no evidence nor history of either inherited or acquired syphilis.

Oro-Pharynx: Careful examination of this region shows two distinct growths, each situated on the lateral and partly on the posterior walls of the pharynx. The growths are distinctly nodular in appearance, each nodule being about the size of a swollen sago grain; quite separate and distinct in the central portion of each mass, but merging into one another at the periphery. Their color is pale pink in the centre, but towards the periphery it becomes a darker hue. The infiltration on each side has invaded the posterior pillar to the extent of about two millimeters, and each is separated from the other by a superficial ulceration 10 m. wide, involving the posterior wall of the pharynx, the surface

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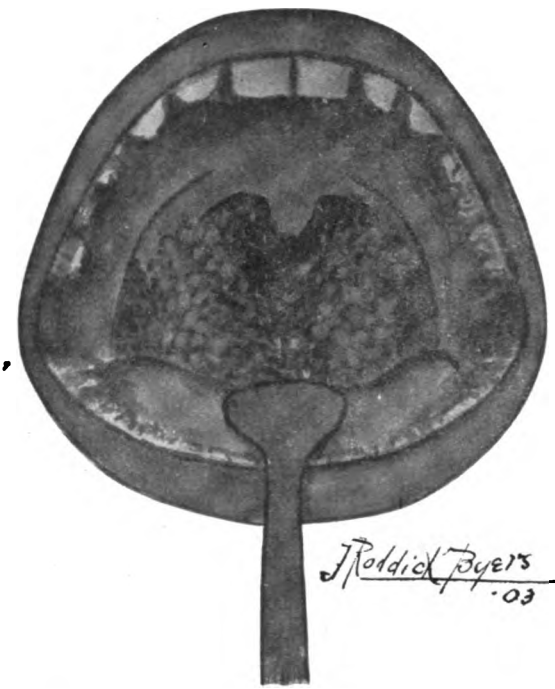
of which is covered with a very tenacious yellowish-colored secretion. The structures anterior to the growths, namely, the tonsils and anterior pillars, are not in the least involved in this process. The uvula, on its palatal surface, apparently seems normal.

Naso-Pharynx: When one examines the naso-pharynx by means of the mirror it is ascertained that these infiltrations extend directly from their position in the oro-pharynx, involving the salpingo-pharyngeal folds, upward to the cushion of each Eustacian tube, and from here towards the centre of the naso-pharynx



Primary Lupus Vulgaris of the Oro- and Naso-Pharynx.

along its roof. The infiltrations, however, in the naso-pharynx leave a space of about half an inch in the vault which is not involved, and are much paler in color than those seen in the oro-pharynx. Careful examination reveals the fact that there is absolutely no extension from here into the posterior nares.

The pharyngeal aspect of the uvula shows two distinct nodular infiltrations, each about the size of a lentil seed, the mucous membrane covering these being quite intact.

The condition as seen at this time in the oro-pharynx is well delineated in the accompanying diagram.

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Under ether, and by means of cutting forceps, I removed the greater portion of the masses involving the lateral walls of the oro-pharynx. This gave considerable relief to the difficulty in breathing, and the removed portions were sent to the pathological laboratory for examination. Dr. Keenan, who kindly undertook this work, has sent me the following report:

"Sections show the specimen to consist of mucous membrane and sub-mucous fibrous tissue. In the sub-mucous tissue there are numerous tubercles. These consist of a central portion of young fibrous tissue with numerous typical tubercular giant cells, and an outer part showing a round-celled infiltration. The mucous membrane is absent in parts where the tubercles have come to the surface. Tubercle bacilli are present, but few in number.

"Diagnosis: Tuberculosis of the mucous membrane.

"A guinea pig inoculated in the peritoneal cavity with portions of the tissue died in three days from septicemia. A second one, inoculated with tissue inserted into the groin, was found at the end of ten weeks to have general glandular tuberculosis."

Further investigation of this case was now carried out, and the patient received three milligrammes of tuberculin (Koch) and the temperature, which previously was normal, now showed a definite and typical reaction to its use, rising to 101 degrees within twelve hours and falling practically to normal within thirty-six hours, and the affected regions showed a marked hyperemia.

The *local treatment,* which was carried out subsequent to the removal of the masses under ether, consisted of curetting the infiltrated areas and subsequently rubbing in pure lactic acid in glycerin. As this gave no encouraging results, the galvano-cautery was tried, with anything but satisfactory results. At this time (Jan., 1903) the patient asked to be allowed to return home, which he did, and remained away until April, 1903.

Upon his return to hospital it was found on examination that the local conditions were practically unchanged. I now decided to try what the *application of the Roentgen-rays* would do for this patient, and under Professor Girdwood's care the treatment was kindly undertaken and supervised. The detail of this treatment, as carried out, is described as follows:

The patient was treated with a Heinze Regulating Tube with a vacuum equal to a three-inch spark gap, which was supplied from an 18-inch coil operated by a Heinze Electrolytic Interrupter. The apparatus is supplied with a direct current of 110 volts, and requires from 2 to 3 amperes. The tube was placed 10 inches from the patient; treatment was begun on the 18th of April, 1903, with ten-minute exposures and without any protection to the healthy tissues for ten treatments, when it was found necessary to stop, owing to inflammation of the surrounding parts. Treatment was suspended for three weeks, and recommenced on May 19th. Since that time he has had twenty-

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three treatments, which have been daily. In these last treatments the face was protected by a piece of wood which had been painted with eleven coats of white lead on each side, which was sufficient to shut out all unnecessary X-rays. This wood is about 12 in. x 12 in., and has a hole in the centre about 3 inches in diameter. The patient opened his mouth as widely as possible and held the screen close to his face, and in such a position as to let the X-rays, which pass through the hole in the screen, strike directly on the back of the throat.

In the month of July the patient was operated upon by Dr. Garrow, who removed the enlarged cervical glands from the right anterior triangle of the neck. Unfortunately, through accident, the glands were lost before an examination could be made.

After recovery from this operation the X-ray treatment was renewed, and at the end of July the local conditions in the throat had entirely disappeared.

The patient returned home and remained there until last November. At this time the condition of the pharynx and naso-pharynx had remained so satisfactory that I regarded the case practically as cured and presented him before the Montreal Medico-Chirurgical Society.

I did not see the patient again until February of the present year, when upon his return I found that the disease was again showing itself by a small ulcer, a centimeter in diameter, situated in the left nostril and involving the anterior part of the cartilaginous portion of the septum. The pharyngeal surface of the uvula, when examined, showed it to be infiltrated at its base by three small tubercles; the naso-pharynx and oro-pharynx otherwise remaining in a healthy condition. I wish here to especially emphasize the fact that there is absolutely no extension of the disease from the naso-pharynx into either nostril, and that the involvement of the cartilaginous portion of the septum seems to be separate and distinct; this being contrary to the experience of most observers that when the nose becomes involved it is always an extension forward of the disease from the naso-pharynx.

The new site of invasion, as well as the oro-pharynx, was exposed to the action of the X-rays in the manner previously described. The results are, at the present time, most satisfactory, and I think there is every reason to believe that the condition will

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give way entirely to this method of treatment, as it did on the former occasion.

It is only within recent years that lupus, as a distinct pathological condition of the mucous membrane of the respiratory tract, has been duly recognized, and this is largely through the efforts of Demme, Koch, von Ziemssen, Rubenstein, Lange, and many others. What is necessary in all cases of this nature is to establish the circle of evidence, namely, the presence of the tubercle bacilli; definite results from inoculation, and, I think one may say, the reaction from the use of tuberculin.

In the present case the tubercle bacilli were found, though, as usually is the case, few in number, and then only after very painstaking search. Again, inoculation of the material removed from the oro- and naso-pharynx into the guinea pig produced a definite tubercular condition of the lymphatic glands. Tuberculin also gave a very typical and definite reaction, not only generally but locally.

Lupus of the respiratory tract, associated with skin lesions of a similar nature, is not uncommon; in fact, were all cases of skin lupus examined regarding the condition of these organs it would be found that they are involved more frequently than is generally supposed. That an examination is not made as a matter of routine is accounted for by the fact that lesions of this nature, involving the respiratory tract, produce practically no symptoms in the early stages of the disease. This was well exemplified in a case of lupus of the nose, without any skin affection, which was quite recently referred to me by Prof. Girdwood, and following out the usual routine examination I found the epiglottis very extensively involved, of which the patient herself was not at all conscious.

It is not necessary here to go over the ground regarding the part which age and sex plays in this disease, or of enumerating the symptoms produced depending upon the regions involved, because these points are well known and ably described in most articles upon this subject, but for those who further desire to obtain a very extensive knowledge of this subject I would refer them to the scholarly article upon these points by Mygind, as detailed in the *Archiv für Laryngologie*, Bd. 10 and 13. The question, however, which interests us mostly, is that of treatment. On reviewing the literature of the subject one finds that lactic acid, iodine solution, corrosive sublimate, permanganate of potash, and the application of the galvano-cautery, has each had its own

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advocate with more or less varying results. It remained, however, for Eduard Schiff, of Vienna, to first treat and cure cases of lupus of the mucous membrane of the respiratory tract. In a recent communication, published in the *British Medical Journal,* May 5, 1900, he gives a detailed account of the method adopted by him, with the results obtained in some of his cases.

Watson-Williams, in his recent work on "Diseases of the Upper Respiratory Tract," stated that X-rays as a procedure "is worthy of trial."

Beyond this work, just enumerated, I have been unable to find any further references to this method of treatment, as applied especially to lupus when attacking the oro- and naso-pharynx; even Christiansen, in his recent paper published in October, 1903, made reference to the use of the Finsen light as applicable only in cases where it can be directly applied.

It will be interesting to learn of the further results which may possibly be obtained through the application of the Roentgen-rays to lupus when occurring in the pharynx and naso-pharynx. I would here state that the patient referred to in this paper as suffering from lupus of the nose with involvement of the epiglottis, has also been placed under treatment by X-rays, and, although too early yet to look for definite results, the progress already made has been so encouraging as to hope for a perfectly satisfactory result.

I wish here to express my indebtedness to my former House Surgeons, Drs. Hannaford McKee, Newbold Jones and McKechnie, for their careful notes of the case, and to Dr. Roddick Byers for the accompanying sketch.

Bibliography.

Schiff, Eduard. British Medical Journal, May 5, 1900.
Wright, Jonathan. Philadelphia Medical News, 1892.
Albers, Schoenberg. Fortschritte a. d. Gebeite d. Röntgenstrahlen, Pt. 1.
Moussous. Journal de Medicine, Bordeaux, July 13, 1890.
Rice. New York Medical Record, April 18, 1891.
Shurly. Diseases of the Nose and Throat.
Watson-Williams. Diseases of the Upper Respiratory Tract, 1901.

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Christiansen, Hans B. Journ. of Laryngology, Rhinology and Otology, Oct., 1903.
Seifert, Otto. Handbuch d. Laryngologie u. Rhinologie, Paul Heymann, Wien, 1899.
Mygind, Holger. Archiv f. Laryngologie, Bd. 10, S. 131, and Bd. 13, S. 372.

Discussion.

Dr. THOMAS J. HARRIS thought that the last point touched upon by the writer called for putting one more case on record, especially as regards the question of treatment. A woman, aged 70, has been under Dr. Harris' care during the last year, and has also been seen by a number of laryngologists in New York and Brooklyn, and the case is now recognized as one of primary lupus, demonstrating the position Dr. Jonathan Wright has held that there is only a line of differentiation between primary tuberculosis and primary lupus. In the case referred to there was a loss of the epiglottis. All other forms of treatment were tried before the X-ray was resorted to. The X-ray treatment was continued for about six months, the application being given two or three times a week by an expert X-ray specialist in New York, with the hope of relieving the continual pain in the larynx. Dr. Harris was now convinced that a tuberculous process developed in the chest. There was not one iota of improvement under the X-ray treatment. The patient did not even admit that the pain had been even temporarily relieved, and no change in the lupus was seen. Dr. Harris had lost track of this patient and had felt much discouraged with regard to this form of treatment, and was therefore glad to have Dr. Birkett present such encouraging reports.

Dr. WILLIAM E. CASSELBERRY considered that Dr. Harris' case would be better described under the name of tuberculosis of the larynx rather than under the name of lupus, and confirmed the testimony with regard to the inutility of the X-ray in laryngeal tuberculosis. He had for a long time treated two cases of tuberculosis of the larynx with the intention of giving the X-rays a thorough trial, the method being applied through the tissues of the neck. No definite results had been obtained.

Dr. A. COOLIDGE, JR., reported a case of a patient who twelve years ago came to him with lupus around the upper incisor teeth and the anterior part of the hard palate. Neither the fauces nor nasal cavity were involved. After consultation with a general surgeon the upper jaw was excised, removing all visible disease with a good margin. The patient made a rapid recovery and soon afterwards married a missionary in Turkey, and spent nine years of her life in that country. At the end of nine years after

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the extirpation of the upper jaw, during which time she had had good health, lupus reappeared somewhere in the region of the scar and has now extended into the nose. If this case had been seen eight years after the operation instead of ten, it might easily have been considered as cured by a very radical operation.

Dr. J. PAYSON CLARK reported a case which has resisted every kind of treatment for a number of years and has steadily gone from bad to worse. The condition began as lupus of the internal nose, gradually involving both alæ. Both alæ have been eaten away; there is a large perforation of the septum, the hard palate is extensively affected, and the process has also attacked the soft palate.

THE ETIOLOGY AND DIAGNOSIS OF OZENA AND ITS RELATION TO PULMONARY TUBERCULOSIS.

BY CLEMENT F. THEISEN, M.D.

IN the Jubilee Number of the *Albany Medical Annals,* January, 1904, the writer published a short preliminary report of his observations—extending over several years—as to the etiology and diagnosis of ozena and its relation to pulmonary tuberculosis. In this paper the cases reported, twenty-one in all, which have since then been more thoroughly studied, will be briefly reviewed, and a further report of nineteen cases will be given, forty in all. These were all genuine ozena cases, in which the usual symptom complex, on which the diagnosis of ozena depends, *i. e.*, the presence of decomposing, foul-smelling secretions, and the atrophy of the mucous membrane, was present. In this paper, this view of the diagnosis will be taken, whatever the origin of the crusts may be. The etiology will be considered, particularly with reference to disease of the accessory cavities, and a history of infectious diseases, like measles, scarlet fever and diphtheria.

The first report, as stated, gave the results of a study of twenty-one cases. In eight of these, positive evidence of sinus disease existed. A more thorough study of these eight cases, has brought out the fact that in four chronic antral empyema (in two combined with chronic ethmoiditis) existed. In two of these cases

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the ozena was bilateral and in two unilateral, the sinus disease existing on the same side. In my first report, the ethmoiditis, in the two cases first mentioned, was overlooked, and was not discovered until a portion of the middle turbinate was removed, and the ethmoid cells were explored.

In three cases (two of bilateral and one of unilateral ozena), ethmoiditis alone existed, and in one case, chronic frontal sinusitis and ethmoiditis.

In the second series of nineteen cases, accessory sinus disease was only discovered in three, in marked contrast to the first series of cases.

In one case, ethmoiditis existed alone, in one, it was combined with empyema of the maxillary antrum, and in one, disease of the sphenoidal sinuses and ethmoid cells was found. The ozena, in the case in which the ethmoiditis and maxillary sinusitis were present, was unilateral, and on the same side as the sinus disease. In the other two cases the ozena was bilateral, as was the ethmoiditis.

We have then eleven cases of accessory sinus disease out of forty ozena cases, or about twenty-five per cent.

The methods used in arriving at these results were briefly as follows: in every case a thorough investigation of the accessible sinuses was made. The nostrils of each patient examined were first freed of crusts and other secretions in the usual way, and then trans-illumination with a lamp of high candle power (that of Chevalier Jackson) was employed. The writer has since come to the conclusion that the candle power of the Jackson lamp is too high. This method did not prove reliable in making a diagnosis of sinus disease, except in two of the cases in which empyema of the maxillary antrum existed.

After the nostrils were thoroughly cleansed, the maxillary antra, in all cases in which the patient's consent could be obtained, were punctured in the usual manner through the nose, and washed out.

This test was employed in nearly all cases. In the cases in which it was found that disease of the antrum existed, foul-smelling pus and other secretions were washed out.

The frontal sinuses were also washed out in as many of the cases as possible.

In seven of the cases in which a diagnosis of ethmoiditis had been made, operations, consisting of a removal of a portion of the

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middle turbinate and curettage of the ethmoid cells, were performed, and the diagnosis was made in this way.

In the ninth case in which ethmoid disease had been diagnosed, the large sequestrum which I have here was removed, after freeing the nose of crusts. It represents part of the left lateral ethmoid mass. The bone was decidedly necrotic, and there had been a purulent discharge from the ethmoid cells. The cells were filled with a thick, foul-smelling secretion.

In the tenth case, the ethmoid cells could be entered without removing any of the middle turbinate, as the bone itself was atrophied and narcotic. The sphenoidal sinuses were also diseased in this case.

In the last two cases, syphilis was probably an etiological factor, but in both the ethmoid cells contained decomposing, foul-smelling secretions.

I will not give a full report of every case in which sinus disease was discovered, but it may be of interest to consider more fully a few individual cases. In one, a radical operation for the cure of a chronic frontal sinusitis was performed, and subsequently the sinus was repeatedly washed out through the nose.

This was one of the cases of unilateral ozena existing on the same side as the sinus disease, and the characteristic odor and decomposing crusts were present. While this patient was under my observation decided improvement of the nasal condition followed the operation and irrigations of the sinus, the odor as well as the offensive secretions being much lessened.

In another case, that of Miss S., aged thirty years, whom the writer has had under observation for eight years, a bilateral ozena and ethmoiditis existed. Several operations for the relief of the ethmoid disease have been performed, with the result that the crust formation and odor have practically disappeared. This patient only rarely comes for treatment at the present time.

The argument may be advanced that such cases, in which accessory sinus disease is present, are not cases of genuine ozena, that the nasal conditions are merely accompanying symptoms of the sinus disease. If we accept the meaning of the term ozena as correct, however, then we must call every case in which the characteristic symptoms, the odor, formation of crusts and other decomposing, foul-smelling secretions, and the atrophy of the membrane, are present, ozena, whatever the cause of the crust forma-

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tion may be. I have purposely not used the term atrophic rhinitis in the title of my paper, because there are many cases to which one term rhinitis atrophica simplex might be applied, in which all the characteristic symptoms of an ozena, complicating sinus disease, are not present. This form of the disease, perhaps, occasionally follows hypertrophic rhinitis.

In this form, in the writer's experience, the crusts are often thinner, dryer and more tenacious, than the thicker, soft, foul-smelling crusts of an ozena accompanying sinus disease. The odor in the cases in which sinus disease is present is, as a rule, even more offensive than in the uncomplicated cases of atrophic rhinitis, and is probably directly due to the decomposing secretions in the diseased sinuses, and need not be explained by the presence of some specific bacillus.

I must confess that if the nasal condition that was present in the eleven cases I have just reported, in which sinus disease was present, is not ozena, I am unable to differentiate it from ozena. The nasal secretion and crusts from a number of cases were examined in the laboratory of the Troy Hospital, by Dr. Dickson, and with the exception of the usual cocci, no distinctive bacilli were found.

I would like briefly to give the history of another of these cases of rather unusual interest: G. H., a boy aged 9 years, suffered from an attack of nasal diphtheria four years ago. His mother, who contracted the disease from him, stated that from the time he had diphtheria he had suffered from occlusion of the nostrils and an offensive yellowish discharge. His nose had been perfectly well before his attack of diphtheria. At the time he came under my observation, September 30, 1903, he had an apparently typical bilateral ozena, with atrophy of the membrane and the unmistakable odor. Both nostrils were filled with enormous soft, muco-purulent crusts. When these were removed pus could be seen in the middle meatal region of both nostrils, and was found to come from the maxillary antra.

Cultures were taken from both nostrils, sent to the Bender Laboratory in Albany and examined by Drs. Pearce and Winnie, who reported that they showed the presence of typical diphtheria bacilli, in conjunction with an organism that was probably Friedländer's bacillus mucosus capsulatus. The interesting feature in this case is the fact that injections of antitoxine caused a rapid disappearance of the crusts; in fact, practically cured the nasal condition. The bacilli were still present when cultures were taken four months ago, but their non-virulence was proved by inocula-

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ting guinea pigs with pure cultures of the diphtheria bacillus obtained from the nose. The pigs all remained well, none showing reaction. I thought at first that this case was one of membranous rhinitis, but if it was it was not possible to differentiate it from ozena.

The case brings out the interesting etiological point that the infectious disease the body had suffered from four years ago probably caused his antral empyema and ozena, and brings us to a consideration of the infectious diseases as causes of sinusitis, and so later on ozena.

One of the popular theories concerning the etiology of ozena is that it sometimes follows cases of "purulent rhinitis of childhood."

While the so-called "purulent rhinitis of childhood" may occasionally be a condition *per se,* the writer is of the opinion that any of these cases are cases of sinus disease, following certain infectious diseases, like measles, scarlet fever and diphtheria. This would of course account for the purulent discharge from the nose that the children have, and if the sinus disease was not recognized, as it frequently is not, there is no reason why the constant discharge from the diseased sinuses would not finally, later in life, produce an atrophy of the membrane and ozena. This of course will not explain why in certain cases of purulent sinusitis polypi and exuberant masses of granulation tissue occur, while in other cases atrophy of the membrane and ozena result. The writer is of the opinion that granulations are more apt to occur when caries exist.

Then, too, we must consider that a patient who has had ozena from childhood may develop later in life a sinusitis, and the impression would be gained that the ozena was secondary to the sinus disease.

It has been demonstrated by a number of writers, among others Emil Mayer and Pearce,[9] that sinus disease may occur very early in life. Pearce's investigations are of particular interest in considering a subject of this kind, because they show the frequency of accessory sinus disease, complicating diphtheria and scarlet fever, in children. Pearce examined the accessory sinuses, particularly the antra, of fifty patients who had died of diphtheria or scarlet fever, in the Boston City Hospital. The heads were so sectioned that easy access to the accessory sinuses could be obtained.

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Thirty-nine cases of diphtheria were examined, and in twenty-five inflammatory changes in the accessory sinuses were found, *i. e.*, both antra in sixteen, both antra, sphenoidal and ethmoidal sinuses in two, one antrum only in five, and the sphenoidal sinus only in two. Of the eighteen double antrum cases, the exudate on both sides, in three, was a thick yellow pus, in three, a purulent fluid with membrane, and in one a cloudy, serous fluid with membrane. Five cases of diphtheria with scarlet fever were examined, and in two, changes in the antra were found. Of these two, one was unilateral and contained a thick yellow pus. Two cases of diphtheria with measles were examined, and both antra in each case contained a sero-purulent fluid. Four cases of scarlet fever were examined; one antrum was normal, in one case there was a double empyema, and in another, both antra and the sphenoidal sinus, contained greenish pus. The fact that cultures from the sinuses showed the presence of the diphtheria bacillus, which in some of the cases on record persisted for months, and even several years, is of great interest, because it is probable, that sinuses so infected, would not get well until their contents were thoroughly evacuated, and the bacilli finally removed by repeated and long continued douching with strong antiseptic solutions. So that if the condition is not recognized, the constant discharge from the sinuses during a long period might finally produce an ozena. Another interesting point in connection with our subject is this: that Pearce's investigations prove that very young children, in whom the sinuses are but slightly developed, as was the case in many of the cases reported by him, may have a sinus empyema following certain acute infectious diseases, and this, as has been shown, may persist for an indefinite period. This then also proves the fallacy of the theory advanced by some authors, that cases of ozena reported in young children could not be secondary to sinus empyema, because the accessory sinuses did not exist in very young children, and the probable truth of Grünwald's theory, that a certain percentage of ozema cases are secondary to accessory sinus disease. It is probable, in view of the positive results of Pearce's investigations, that a large percentage of children who have had infectious diseases, have as a result a purulent sinusitis, which may not be recognized for a long time, and may finally produce the characteristic changes in the nasal mucous membrane.

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The main supporters of the "Herd" theory for the origin of ozena are Michel,[2] Grünwald,[3] Löhnberg,[6] Hajek,[7] Luc, and Bresgen. Michel and Grünwald believe that a considerable percentage of ozena cases are caused by purulent processes in the accessory cavities. Grünwald formerly was of the opinion that sinus suppuration existed in practically all cases of ozena, but has since modified his views somewhat. Löhnberg, who at the present time is, perhaps, the most enthusiastic advocate of the "Herd" theory, goes so far as to state that he found the accessory cavities diseased in every one of seventy-nine ozena cases, *i. e.*, twenty-four times an empyema of the sphenoidal sinus, six times of the frontal sinus, ten times of the ethmoid cells, and thirty-nine times of the maxillary antrum. This is certainly a strong argument in favor of this theory.

Alexander,[8] however, who has recently published a paper on the diagnosis of ozena and its relation to pulmonary tuberculosis, quotes the investigations of other authors, who reported twenty-two autopsies of ozena cases. Affections of the accessory sinuses were only present in eight of these twenty-two cases. It is rather difficult to reconcile these findings with Löhnberg's statements. I will merely mention some of the other theories concerning the origin of ozena, particularly the crust formation and odor. Abel,[11] Löwenberg,[5], Perez,[10], Massei, Luc, Thost, Marano and Klamann are all advocates of the so-called infection theory, and Abel, Löwenberg, Paulsen[13] and Perez[10] believe that certain bacilli that they found in ozena cases were responsible for the odor. Abel called his bacillus the "bacillus mucosus," and claimed that he was able to produce in animals, with cultures of his bacillus, the same atrophic nasal process that occurs in man.

Perez gave to the organism he found in ozena cases the name "bacillus fetidus ozenæ," and Paulsen called his the "bacillus mucosus."

Cholewa and Cordes[12] have advanced a plausible theory, in attributing the formation of the nasal secretions of ozena and the changes in the membrane, to a rarefying ostitis of the turbinated bones, causing secondary disturbances in the circulation, and so the changes in the membrane.

Hopmann[14] has made a number of measurements in ozena cases, and attributes the atrophy of the membrane mainly to a shortening of the nasal septum. Siebenmann[15] believes that the

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formation of the skull, producing very wide nostrils, is the main etiological factor.

To return to my own cases: In the other twenty-nine no sinus disease could be discovered, but many of the patients gave a history of having had measles, scarlet fever or diphtheria, early in life, and the mothers of some of the younger patients told me that they had had, after the infectious disease, a yellow discharge from the nose for a long time, so that it is quite possible that some of these patients, as well, had suffered from suppurative processes in the accessory cavities which had got well spontaneously. With the exception of the infectious diseases of childhood, no possible etiological factors (except that four had the characteristic saddle back noses and syphilis was the probable cause in these cases) could be discovered.

The sinuses in most of these twenty-nine cases, were also investigated in the manner before mentioned.

The patients were all young adults, twenty-four being women and girls, and sixteen men, the ages varying from nine to thirty-five years.

To come now to a consideration of the relationship between ozena and pulmonary tuberculosis, in the forty cases considered in this paper, the writer has some interesting and rather startling results to offer.

In the first series of twenty-one patients, eight were found to have pulmonary tuberculosis (two of them being also complicated by laryngeal tuberculosis). Of the other nineteen cases, six had well marked physical signs of pulmonary tuberculosis, making fourteen cases of pulmonary tuberculosis out of forty ozena cases, certainly a very high percentage.

In nine of these, tubercle bacilli were found in the sputum, and physical signs were present in the lungs. In the other five, physical examination of the lungs was so positive that a sputum examination was unnecessary. Five of these fourteen patients have died of the tuberculous condition while they were under the writer's observation (two of them being the cases complicated by laryngeal tuberculosis).

If you will bear with me a moment longer, I would like to give a brief history of one of these cases of rather unusual interest.

Miss A. B., aged 24 years, has a well-marked bilateral ozena. No tuberculous history. Tubercle bacilli were found in the spu-

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tum, and there were well-marked physical signs of tuberculosis. A suppurative otitis media, which was found to be tuberculous, bacilli being found in the pus from the middle ear, was also present in this case, and later developed into a mastoiditis, requiring operative interference. Following the mastoiditis this patient has developed laryngeal tuberculosis. When last seen by the writer, two months ago, the laryngeal tuberculosis was well marked, although the general condition was fair, as she has been taking creosote right along.

Alexander, in the paper already referred to, reported fifty ozena cases—all selected—but irrespective of the fact whether there was a family history of tuberculosis or not. The interesting point was elicited that the majority of the patients in whom lung trouble was present had no idea of its existence. Twenty-two of these fifty cases showed positive evidence of pulmonary tuberculosis, both on percussion and auscultation. So that nearly half of Alexander's ozena patients had tuberculosis, a larger percentage than in the writer's cases.

It is more than a coincidence that fourteen out of forty ozena patients should have pulmonary tuberculosis, and would point to an etiological relationship. When we consider that in ozena the normal functions of the nose, to warm and moisten the inspired air and to free it from dust and other substances, are absolutely interfered with, we can readily understand how a tendency to tuberculosis may be established. The thin, watery mucus, in a normal nose, washes out the dust and bacteria, and the investigations of Hewlitt and St. Clair Thompson have also shown that the normal nasal mucus has bactericidal properties. In eighty per cent. of the cases examined by them the normal mucus was found absolutely sterile, micro-organisms being only found in the nasal vestibule. In ozena, with a nose full of thick, foul-smelling crusts, the nasal passages certainly cannot be washed out. All inspired substances, which may be filled with bacteria of all kinds, cling to these thick, tenacious crusts, which in many cases consist of nothing more than dried pus from the accessory sinuses; the bacilli find a perfect culture medium, and may later be carried to the throat and lungs. In the words of Alexander, "the nose, or the filter which should protect the body from the bad results of the invasion of the micro-organisms, *itself* becomes a culture medium for these organisms, and becomes a permanent source of infection. The following eleven ozena cases are the ones mentioned in

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my paper, in which disease of the accessory sinuses existed. In eight of these cases pulmonary tuberculosis was discovered.

CASE I.—Miss C. C., aged 22 years. Has had nasal disease for a long time. No family history of tuberculosis. Patient had scarlet fever in childhood. States that there is a yellowish discharge from both nostrils after she gets rid of the crusts. On examination both nostrils were filled with crusts, and the characteristic odor was present. Trans-illumination was negative. The maxillary antra were punctured through the nostrils, and an offensive, thick, purulent secretion was washed out of the right antrum. Pus could be seen in the middle meatal region after the crusts were removed. On examination of the lungs, dullness and a prolonged expiratory murmur were discovered at the apices. Tubercle bacilli were found in the sputum.

CASE II.—Miss H. C., aged 17 years. Diagnosis: Ozena unilateralis (left nostril). Trans-illumination gave a shadow on the left side, and when the antrum was punctured in the usual way an offensive, purulent secretion was washed out. There was a family history of tuberculosis, and on physical examination dulness on percussion was found at both apices. Patient had diphtheria when eight years old, and has had nasal trouble since that time.

CASE III.—Miss C. K., aged 20 years. Diagnosis: Ozena bilateralis, with chronic antral empyema and ethmoiditis. No family history of tuberculosis. Says that she had scarlet fever in childhood, and nasal trouble since then. Both antra were found to be diseased, as well as the ethmoid cells. The antra were punctured and washed out, and portions of the middle turbinates removed, and the ethmoid cells explored.

CASE IV.—Miss A. G. B., aged 22 years. Diagnosis: Ozena unilateralis (right nostril), with disease of the maxillary antrum and ethmoid cells.

Antrum was punctured and washed out, and after removing anterior part of middle turbinate, the ethmoid cells were explored and a purulent secretion discovered. No family history of tuberculosis, but tubercle bacilli were found in the sputum. An offensive pus was washed out of the antrum.

CASE V.—Miss M. K., aged 29 years. Diagnosis: Ozena bilateralis, with unilateral ethmoiditis. Diagnosis made in the usual way, after removing a portion of the middle turbinate and curetting the ethmoid cells. An offensive purulent secretion was found. Patient had scarlet fever in childhood, and says that she has had nasal trouble since that time. No history of tuberculosis in the family, but tubercle bacilli were found in the sputum, and physical signs at the left apex.

CASE VI.—Miss S. M., aged 30 years. Diagnosis: Ozena bilateralis, with bilateral suppurative ethmoiditis. An offensive se-

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cretion was found in the ethmoid cells, after removing portions of the middle turbinates. No history of tuberculosis in the family, but tubercle bacilli were found in the patient's sputum.

CASE VII.—Miss H. J., aged 29 years. Diagnosis: Ozena unilateralis (left), with chronic frontal sinusitis and ethmoiditis. A purulent secretion was washed out of the frontal sinus, and this condition was also found in the ethmoid cells. Patient had scarlet fever in childhood. A radical operation for the relief of the suppurative frontal sinusitis was performed, which was followed by decided improvement of the nasal condition.

CASE VIII.—A. H., a boy aged 9 years. Diagnosis: Ozena bilateralis, with bilateral antral disease. Trans-illumination gave a shadow on one side, but not on the other. This is the boy from whose nose diphtheria bacilli were obtained. The case is fully described in my paper.

CASE IX.—Mr. M. H., aged 30 years. Diagnosis: Ozena unilateralis, with chronic ethmoiditis. In this case a large sequestrum was removed from the nose and ethmoid disease was discovered. Curettage was performed, and an offensive purulent secretion was discovered. Patient had scarlet fever in childhood, but was probably a syphilitic subject.

CASE X.—J. S., aged 22 years. Diagnosis: Ozena bilateralis, with chronic ethmoiditis and sphenoidal sinusitis (unilateral). Caries of the ethmoid and anterior wall of the sphenoidal sinus were found in this case. Tubercle bacilli were found in the sputum, although the patient was also probably a syphilitic subject.

CASE XI.—Miss L. B., aged 30 years. Diagnosis: Ozena bilateralis, with chronic suppurative ethmoiditis (left nostril).

After removing the crusts some pus was seen in the middle meatal region, and an exploration of the ethmoid cells, after removing the anterior portion of the middle turbinate, showed the presence of ethmoid disease.

Conclusions.

1. Sinus disease probably causes ozena in a certain percentage of cases, or at least it must be considered a strong predisposing cause.

2. Suppurative processes in the accessory sinuses, as shown by Pearce's investigations, are frequently present in certain of the infectious diseases of childhood, particularly scarlet fever, measles and diphtheria, and for this reason these infectious diseases must be considered at least possible etiological factors of ozena.

3. That while a certain percentage of cases is caused by sinus disease, this is not sufficient to explain the pathogenesis of the whole clinical picture of ozena.

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4. The large number of ozena patients having pulmonary tuberculosis would certainly point to the nasal condition as a strong predisposing cause for the development of the tuberculous condition.

Bibliography.

1. Zuckerkandl, E. Normale und pathologische Anatomie der Nasenhöhle, und ihre pneumatischen Anhänge, Bd. 1, Auflage II, S. 242, 1893.
2. Michel, E. Die krankheiten der Nasenhöhle und des Nasenrachenraums, Berlin, 1876.
3. Grünwald. Die lehre von der Naseneiterungen, 1893.
4. Abel, R. Bakteriologische Studien über Ozaena simplex Centralblatt für Bakteriologie, Bd. XII, S. 5.
5. Löwenberg. Die Natur und die Behandlung der Ozaena. Deutsche medicinische Wochenschrift, 1885, S. 5.
6. Löhnberg. Aetiologie und operative Behandlung der genuinen Ozaena, etc. Berliner klinische Wochenschrift, No. 11 to 13, 1900.
7. Hajek, M. Pathologie und Therapie die entzündlichen Krankheiten der Nase, S. 267, 1899.
8. Alexander, A. Archiv für Laryngologie und Rhinologie, Heft 1, Bd. 14, 1903.
9. Pearce, Richard M. The Bacteriology of the Accessory Sinuses of the Nose in Diphtheria and Scarlet Fever. The Journal of the Boston Society of Medical Science, March, 1899.
10. Perez, F. Recherches sur la bacteriologie de l'ozene. Annales de l'Institut Pasteur, No. 12, 1899.
11. Abel, R. Die aetiologie d. ozena. Zeitschr. f. Hygien, u. Infektions Krankheiten, Bd. 21, 1896.
12. Cholewa u. Cordes (zur Ozaena Frage). Archiv f. Laryngol, u. Rhinol, Bd. VIII, Heft 1.
13. Paulsen. Ueber einem Schleimbildenden Kapsilbacillus bei atrophierenden Rhinitiden. 1893.
14. Hopmann. Ueber Messungen des Tiefendurchmessers der Nasenscheidewand, etc. Archiv f. Laryngol, u. Rhinol, Bd 1, Heft 1, 1893.
15. Siebemann. Ueber Ozaena (Rhinitis atrophica simplex und foetida), 1900.

Discussion.

Dr. J. L. GOODALE stated that one may regard the term ozena as applicable to a variety of clinical conditions, if it is assumed that the term denotes a condition of the mucous membrane characterized by the presence of fetid crusts. All that is necessary to bring about this clinical appearance is the destruction of the

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columnar epithelium and the checking of the normal transudation through the mucous membrane. One of the most important elements in bringing about the changes spoken of is the diminution in the amount of fluid brought to the surface of the mucous membrane. The fluid which reaches the surface of the nasal mucous membrane in ozenic conditions contains a relatively large amount of mucus from the mucous glands, with an abnormally small proportion of watery or albuminous fluid. As a result of the dry surface, the normal transfer of nasal secretion from the interior in an outward direction is checked.

Dr. THOMAS J. HARRIS considered this an important question. He stated that when he first studied his clinical cases he was inclined to think that Grünwald had touched the true nature of ozena, but in his later observations he had come to the conclusion that he was too enthusiastic. With regard to the relation between sinus disease and ozena, Dr. Harris had seen nineteen cases of what Dr. Theisen has properly called genuine ozena, presenting the three characteristic symptoms. In these nineteen cases he had carefully searched for any evidence of sinus disease. He followed somewhat the same line of examination as did Dr. Theisen, trans-illumination, the examination by puncture of the antrum, and washing out where it was possible the frontal and sphenoidal sinuses. In all these cases he had found but two of antrum disease, in each case unilateral; and in a third case, making three out of nineteen, he found an ethmoidal sinus affection. Other than this, he was unable to recognize any sinus complication.

With regard to the relation between tuberculosis and ozena, Dr. Harris stated that he did not make the same careful examination in these cases. It was his regular procedure, however, to carefully examine every case of ozena for other conditions in the chest, and in twelve cases he recalled only one which showed a condition of tuberculosis, and this patient had laryngeal tuberculosis when he presented himself for treatment. This patient had two children who had genuine ozena without tuberculosis. The patient was self-cured of his ozena. In the other cases there was no tuberculosis, this being confirmed by observation extending in some instances over from five to ten years. Hamilton stated that in one hundred cases of tuberculosis he found no ozena, but that in fifty ozena cases he found the tubercle bacillus. He also discovered only six cases of tuberculosis in one hundred and seventy cases of ozena. Dr. Harris therefore called attention to the marked difference between the results obtained by Dr. Theisen and those obtained by Hamilton. He thought that very possibly the question of climate did something to explain it. Solly, in a paper read before the American Climatological Association, in speaking particularly upon ozena, dwelt upon the relation of general affections of the nose to tuberculosis, and made the statement that he found in quite a large percentage of cases submitted some

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form of nasal culture. Ingals, in his Thesis before the British Medical Association, without giving definitely the statistics of ozena, drew the conclusion from an experience extending over four thousand cases that ozena, or, probably as he described it, the chronic atrophic form, occurred less often in proportion than the average nasal diseases in relation with tuberculosis.

Dr. CORNELIUS G. COAKLEY was especially interested in the foregoing paper with reference to the relation between ozena and diseases of the accessory sinuses. It had been his good fortune to see quite a number of cases of diseases of the accessory sinuses, and also quite a number of cases of ozena. It had been the rarest thing in his experience to find cases of typical disease of the accessory sinuses accompanied by those conditions which are regarded as ozena, namely, the fetid crust formation or atrophy of the mucous membrane. In almost every case the mucous membrane was either but slightly affected or edematous and accompanied by polypoid formation. On the other hand, Dr. Coakley's experience in examining cases of ozena with reference to suppuration of the accessory sinuses had been that it is most unusual to find the accessory sinus involved. He had treated these cases on a very different plan from that ordinarily employed, and had found it to be quite satisfactory.

He condemned the Jackson apparatus for trans-illumination as being practically useless. In the first place, the amount of illumination was very frequently too intense to be of the greatest use. He stated that better results were obtained by the use of an apparatus with varying candle power, this power being changed for each individual case according to the thickness of the bones of the individual and the penetration of the light through a healthy or diseased sinus, whether it be maxillary or frontal. It was only by employing such an apparatus and in taking the patient into a dark room, and not, as recommended by Dr. Jackson, using the trans-illumination in broad daylight, that the best results were obtained. Again, by following out this method of puncture and, when possible, probing, with washing out of the frontal sinuses, it was exceedingly rare to find accessory sinus disease in typical ozena cases. Dr. Coakley did not believe that there was any connection between the two conditions. He believed that in Dr. Theisen's case the ozena was secondary or dependent upon a tertiary manifestation. In all tertiary lesions where there is an extensive necrosis one was apt to have some infected material pass off from the ethmoid region in the antrum or frontal sinus.

It did not seem to Dr. Coakley that a strong antiseptic solution was indicated in cases of accessory sinus disease. There were simple fluids which removed the products of bacteriological inflammation and did all the good possible without the harmful reactive inflammation occurring after the use of strong antiseptic solutions. He never used anything but normal salt solution.

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Dr. EMIL MAYER called attention to affections of the maxillary sinus in young children, and referred to the work of Pearce of Boston, who had reported on some fifty autopsies in this class of cases. Avellis, of Frankfort, has made the statement that there is no such thing as empyema of the antrum of Highmore in young infants; he claims that there is no antrum at this time of life. To this conclusion Dr. Mayer took exception, as it is amply demonstrable that an antrum is present. In eight cases which Dr. Mayer had collected of empyema of the antrum of Highmore in young infants there was a fistulous opening in the cheek, eversion of the lower lid, and ozena in each case. He therefore considered that infection of the accessory sinuses in young children does bring about ozena.

Dr. J. PAYSON CLARK said with regard to ozena and tuberculosis that several years ago he examined one hundred cases of tuberculosis of the lungs, studying them particularly with regard to the nose, and compared with them one hundred cases coming to the clinic with other troubles. He was struck with the great proportion of cases of ozena and atrophic rhinitis in the cases which had tuberculosis of the lungs, as compared with those having no phthisical symptoms. His report of this study was published in the *Boston Medical and Surgical Journal*, Oct. 3rd, 1895.

Dr. JAMES E. NEWCOMB stated that since last October he had had occasion to examine seventy cases of tuberculosis, and did not meet with a single case of ozena, using that term to signify a foul-smelling discharge. There were seven or eight cases in which the nose presented an atrophic condition. All these patients came from the distinctly working classes, some having been in domestic service, others from department stores, some were bookkeepers and a few stenographers. Most of them had not had good environment, the majority being tenement-house dwellers. He considered that in this class of patients the atrophic condition of the nose and the tuberculosis were probably the sequel of the bad general environment acting as a common cause.

Dr. H. L. SWAIN called attention to the fact that several years ago Dr. Logan presented before the Association a paper in which he reported a large number of atrophic rhinitis cases from among his clientele. Dr. Swain did not consider the term ozena to mean the bad smell of suppuration, of necrosed bone, or the fetid discharge from the sinus, but an atrophic rhinitis. In this conception he had taken of atrophic rhinitis he was sure that the sinus disease in his practice was not any more frequently present among the ozena cases than among the others, as there was so large a proportion of the country's population which had tuberculosis in one form or another. He thought it a reasonable conclusion that tuberculosis may be closely associated with ozena, since if a foul-smelling discharge or diseased mass of tissue has existed in the nose there is a distinctly fine chance for the growth

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of all kinds of bacilli. In the squamous type of papilloma epithelium it is almost impossible for the right amount of moisture to come through into the nose. Underneath the scabs in this type there is also a moist mass, and this offers a fertile ground for any bacilli which arrive. It would, therefore, seem that all that was necessary was to keep these surfaces clean, but Dr. Goodale had shown how well-nigh impossible it is for this mucous membrane to regain its normal equilibrium. With reference to the question of climate, Dr. Swain thought there were naturally very diverse experiences with regard to this point, owing to the different environments, and believed that physicians practicing in Kansas City, for example, found a greater number of atrophic rhinitis cases in their clientele than did those practicing on the eastern Atlantic Coast.

Dr. THOMAS HUBBARD stated that in the existence of a certain percentage of atrophic rhinitis cases and of tuberculosis cases in a given number of the population it would naturally be expected that an overlapping would occur, and therefore the co-existence of the two would be coincident. This had been his own conclusion, formed and based upon observations suggested by several family groups of pronounced tuberculosis having ozena. Further observation has failed to confirm that it is any more than a mere coincidence. Given a case of even moderate degree of atrophic rhinitis and a slight elevation of temperature, and one may see develop all the characteristic symptoms of ozena. He believed that any case of typhoid fever with even a slight dry catarrh would develop in the course of that sickness numerous scab formations, which would suggest the existence of ozena. Therefore, in cases of tuberculosis one must take into consideration the feature of temperature. This means naturally the drying of all mucous membranes, and a slight atrophic condition of the nasal mucous membrane would tend toward the development of a condition which it would be very difficult to differentiate from ozena.

Dr. WILLIAM LINCOLN thought that in the endeavor to find some practical cause for ozena there had been an over-zealousness in the study of these cases. He had heard a number of papers read in which there was an effort made to fasten the cause of ozena, or atrophic rhinitis, on some disease. He agreed with Dr. Theisen that there are a number of cases of tuberculosis that exaggerate the symptoms of ozena. He also agreed with Dr. Hubbard and Dr. Newcomb in their remarks that any disease wihch seriously impairs health and strength may be accompanied by an atrophic condition of the areolar tissues of the nose and with ozena. He referred to three cases which, subsequent to serious operations, were followed by a very low condition of the general bodily health and the development of ozena. This symptom however, yielded with the restoration to good health of the pa-

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tient. Dr. Lincoln therefore thought one should be careful in the consideration of such cases not to try to fasten the cause of ozena upon any one disease, but to keep steadily in mind that any vastly depleting disease may be followed by ozena, or atrophic rhinitis.

Dr. WILLIAM E. CASSELBERRY stated that it was his opinion that a conclusion with regard to this subject would never be reached until the term ozena was discarded altogether, or at least accurately defined. To him ozena simply signifies a foul smell in the nose. He stated, however, that the writer of the paper had evidently grouped together three different diseases under this term: first, syphilis; second, the ozenal type of atrophic rhinitis; and third, that condition which results from a foul accumulation of chronic suppurative discharge from the sinuses. Several years ago Dr. Casselberry carried through a series of investigations very similar to the ones just described. He searched carefully by the puncture test in all cases of atrophic rhinitis of the ozenal type, but was able to find sinus suppuration in only a small percentage of the cases, and it was therefore his belief that there is no definite etiologic connection between the two. That condition of circumscribed atrophy in one or other nostril associated with sphenoidal or posterior ethoidal sinus suppuration is, after a close clinical study in his cases, quite distinct from the ordinary ozenal type of diffuse atrophic rhinitis. This is a sub-division of the third disease above mentioned, the frontal and maxillary suppurations, although possibly accompanying atrophic rhinitis, being not usually productive of atrophy, although often foul in odor. It is believed that all sinus suppurations are distinct from typical atrophic rhinitis with incrustment. Atrophic rhinitis itself is divisable into two types: that with incrustation and odor, which he has named the ozenal type of atrophic rhinitis, and that without odor, although these may be simply variations in degree. If the term ozena is limited to the ozenal type of atrophic rhinitis, then sinus suppuration has only a coincidental and not an etiologic connection with it.

Dr. THEISEN agreed with Dr. Casselberry that it depends very largely on one's understanding of the term ozena. He called attention to the fact that in his paper he stated that the cases were considered as genuine cases of ozena whatever the cause might be, and it was also stated that syphilis was probably a factor in two of the cases. There was no reason why sinus disease and syphilis may not be present at the same time. He also stated that he only considered a small percentage as due to sinus disease, and that the cases reported were all selected ones, in which he suspected sinus disease or looked for it in connection with the ozena.

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SEQUEL TO THE CASE OF POST-TYPHOID PERICHONDRITIS OF THE LARYNX PREVIOUSLY REPORTED.

BY EMIL MAYER, M.D.

At the 25th annual meeting of the American Laryngological Association I presented the report of a case of this affection subsequent to typhoid fever, which was afterward published in the *New York Medical Record* (July 25, 1903), and in the Transactions of this Association for 1903.

The history, in brief, was as follows: Female, aged 28. Typhoid fever, October, 1902. Discharged cured December, 13, 1902. Slowly increasing dyspnea, which became urgent, requiring tracheotomy January 13, 1903. March 11, 1903, gradual dilatation by Schrotter's tubes. April 20th, intubated with the O'Dwyer tube, under chloroform. The tube was then worn for six weeks, when it was removed. Eight days later she was again intubated, without chloroform, for increasing dyspnea, and at the time of publication was still wearing the intubation tube.

Her subsequent history is as follows: The intubation tube which I reintroduced June 8th remained *in situ,* the external wound promptly closed, food was readily swallowed, and except that the voice was but little above a loud whisper, there was no discomfort whatsoever. On July 1st she took a sea voyage and went to her home in Norway, not without some trepidation lest an unusual attack of seasickness might result in a sudden expulsion of her tube. She was prepared for such an emergency with proper instruments for reinserting the intubation tube, and also, should that be impossible of execution, she was possessed of a tracheotomy tube and canula. Happily, none of these precautionary measures became necessary, and she returned to New York on the 1st of September, 1903, having worn the same tube continuously for three months.

September 1, 1903—Has just returned from a three months' visit to Europe, during which time the large O'Dwyer tube has remained *in situ.* She was readily fatigued on slight exertion, and for the last six weeks has been much annoyed by bad odor from the tube. During my absence from the city she prevailed

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upon my assistant, Dr. Yankauer, to remove the tube, which he did on September 1st.

September 2nd—Twelve hours after removing the tube dyspnea began, which became more severe during the night and was quite marked in the morning. The whole larynx was red and swollen, the false cords could not be distinguished from the true, and the interior of the larynx looked like a red cone with a small opening at the bottom. It was impossible to re-introduce the large tube, and the largest of the metal tubes, children's size, was introduced.

September 3rd—While Dr. Yankauer was making preparation to examine her larynx she coughed up the tube, and she breathed fairly well for two days, when I saw her. On examination I found the following condition:

The laryngeal interior was now distinguishable, though red and inflamed, without dyspnea. A little mass of granulation tissue appeared below the anterior junction of the cords. For the next five days she had no disturbance with her breathing, and her voice became stronger each day. On the 10th she complained of some increase of the dyspnea, and on the 12th her dyspnea was marked on the slightest exertion. There appeared to be a fixation of one-half of the larynx on her left side, the right cord being perfectly distinct, while the left was entirely hidden by a band running above the line of the false vocal cord, narrowing the lumen of the larynx. Below the cords, and about on a line with the cricroid cartilage, there was some thickening and narrowing of the lumen. A Number 5 Schrotter tube was now forcibly introduced under cocaine, and was followed by expectoration of blood. The adult size O'Dwyer tube could not be introduced, but the largest children's size metal tube was readily introduced.

September 15th—Has been breathing comfortably through the tube. Directly over the head of the tube are two edematous swellings, which do not however encroach upon the orifice of the tube.

September 19th—Tube readily extubated under cocaine spray, with no dyspnea resulting. The edematous swelling above mentioned has disappeared and the general appearance of the larynx is more nearly normal in color than it has been at any previous examination.

September 22nd—Has had no trouble in respiration since extubation. Voice clear, but deep. Some thickening visible at the junction of the cords; both cords visible, band on the left hiding the cord disappeared. Benzoin inhalations, no local treatment.

May 25, 1904.—It is now nine months since the last extubation, and at no time since then has there been any dyspnea; her voice is husky and deeper in tone than formerly; her general condition is that of perfect health; she has increased in weight and attended to her usual duties, so I believe that I may now state

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definitely that a cure has been effected, this being the first case recorded cured by intubation, and that it records one more success for the O'Dwyer method and a triumph for modern surgery.

The special points of interest are: (1) The unusual nature of its origin. (2) The length of time the tube was worn. (3) The ease of deglutition after intubation. (4) The use of the child's size toward the last for a short time. (5) It is the first case of this affection cured by intubation.

Discussion.

Dr. WILLIAM E. CASSELBERRY spoke of a certain tube suggested by Rogers, and described by Simpson three years ago, which has a horizontal arm inserted through a tracheotomy opening to anchor the intubation tube, and asked if either Dr. Simpson or Dr. Mayer had had any additional experience with it, as he was contemplating its use in a patient with chronic stenosis, who coughed out tubes as fast as they could be introduced.

Dr. JOHN EDWIN RHODES, alluding to the danger of wearing such a tube, referred to a patient under his care who was obliged to wear an O'Dwyer tube for several years, the tube being removed about once a month and cleaned. In this case there was not the danger of coughing it out, but of a collection of mucus occurring in the tube. Dr. Rhodes was fortunate enough to be called in just in time one night to save this patient from death, the tube having become occluded with mucus. It finally became necessary to do a tracheotomy, and the patient is now wearing a tracheotomy tube and is a strong, vigorous young man.

Dr. W. K. SIMPSON stated that he had intended to present a case in line with this paper before this meeting of the Association, but was prevented from so doing owing to the development of some complications in the case, and he would therefore reserve his remarks on the case until next year.

With reference to the question of the effects of intubation on intra-laryngeal obstruction, he believed that a great deal depended on the character of the induration. In Dr. Mayer's case the type of induration was not that of the diseased wall type found in the specific thickening, and he was therefore able to get a better absorption.

In reply to Dr. Casselberry's inquiry, he would state that he had not had any further experience with the type of tube mentioned In the one patient referred to he used this type of tube, but she had now worn the ordinary adult intubation tube for fourteen consecutive months and would not allow its removal. It sometimes came out as far as the teeth, but she replaced it herself. He was anxious some time ago, when she traveled to Detroit, lest the tube should be coughed out and she be in a precarious condition. This did not occur.

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In regard to another point mentioned, Dr. Simpson stated that there was more danger of occlusion by mucus in a metal tube after a certain length of time than in a hard rubber tube, and also from calcareous accretions, which produced a certain amount of granular tissue, and he thought that to this was due in certain cases the subsequent dyspnea or stenosis after the tube was removed. He therefore advised the substitution of a hard rubber tube under such circumstances.

Dr. MAYER, in closing the discussion, said that in reference to the dangers of allowing a patient wearing an intubation tube to go on an extended sea voyage far from skilled help, he had fully realized it and had taken every precaution to insure either prompt return of the intubation tube, or that failing, to have tracheotomy performed. He himself had seen the ship's physician, and the history of the case carefully gone over, and full instruction was given to the former. The patient carried with her constantly in a most convenient place a new intubation tube, with applicator, and also a tracheotomy tube. Tracheotomy would have been simple through the scar of the first incision. Happily, none of these precautions became necessary.

RECENT ADVANCES IN THE TREATMENT OF MALIGNANT DISEASE OF THE LARYNX.

BY D. BRYSON DELAVAN, M.D.

THE object of this paper will be to indicate the progress recently made in the study and care of malignant disease of the larynx, to call attention to certain especial points of treatment which seem of sufficient value to demand investigation and discussion, and to offer some personal suggestions, general and special, bearing upon the subject.

The laws governing the nature and development of cancer in man are, of course, general, applying to the disease wherever located. This being true we are able to record an advance of great importance in the study of this affection.

Within the past two or three years a widespread movement has been made in the direction of the general investigation of the causes and the specific nature of cancer. Funds have been appropriated and laboratories established for

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the purpose in this and several other countries. The work is in its infancy, and sufficient time has not yet elapsed to bring forth important practical results. Certainly, it appears that the intelligent and earnest effort which is likely to be put forth in the investigation of the subject at the new centres of special research gives hope that much good may be accomplished. Already the English commission has established the fact that new growths of many of the typical kinds may be found in an almost infinite variety of the vertebrates, including quadrupeds, birds, and fishes. Its investigations have also seemed to place upon a positive scientific basis the time-honored proposition that, in the present state of our knowledge, *early radical operation offers the only reliable prospect of cure.*

In the department of the physiology of the larynx, Crile, of Cleveland, Ohio, has reported the results of his investigations as to the effect of certain irritations of the larynx upon the pneumogastric and the recurrent laryngeal nerves and upon various other organs, notably the heart, which the pneumogastric supplies. His observations are of vital importance in their relation to the surgery of the larynx, and mark an epoch in the progress of our knowledge of this subject, especially with reference to the proper management of patients under surgical care.

Lacking new suggestions of value as to the etiology and pathology of cancer, we may proceed to the consideration of the treatment. Before doing so, however, one point must be clearly understood. As long ago taught by Krishaber, carcinoma may originate outside of the cavity of the larynx or within it. Extrinsic laryngeal carcinoma is practically incurable by operation. Attempts at extirpation are dangerous and recurrence is almost certain. The best hope for temporary relief seems to be in the external application of the X-ray, and possibly in ligation of the carotids.

With intrinsic carcinoma the outlook is far more promising, and it is with the consideration of this form of the disease that this paper will exclusively deal.

The methods proposed for the treatment of laryngeal cancer which may properly be discussed are: (1) Internal medication; (2) antitoxins; (3) liquid air; (4) ligation of the carotids; (5) the X-ray; (6) the ultraviolet and the high-frequency rays; (7)

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radium; (8) surgical methods: (*a*) endolaryngeal, (*b*) extralaryngeal.

Rapidly considering these in order as above:

1. There is no known drug, from arsenic to Chian turpentine, which will cure laryngeal carcinoma.

2. Its treatment by the antitoxins thus far proposed has been a failure, neither the serum of Coley nor that of Adamkiewicz having given any valuable results.

3. Liquid air, recently recommended in the treatment of superficial growths of various kinds, does not seem applicable in cancer of the larynx or even in external superficial epithelioma, and the method is not likely to prove of practical use in this department.

4. Ligation of both carotids by Dawbarn's method has never, to my knowledge, been followed by actual cure. In several cases, on the other hand, it has seemed distinctly to retard the progress of the growth and has resulted in such general improvement of the case as to have fully warranted its performance. In sarcoma its value is apparently beyond question. In inoperable cases of carcinoma, especially of the extrinsic variety, this method is well worthy of consideration.

5. The expectations which were aroused by the discovery of the X-ray have not been realized. With one exception not a single success by this means has been recorded. In the case reported from New Orleans the patient died of laryngeal cancer within a few months of the extensive advertising of its alleged cure. Dr. George F. Cott, of Buffalo, reports a case of partial extirpation of the larynx with recurrence in four months. Following sixteen exposures to the X-ray, the growth entirely disappeared,* and at present, seventeen months later, the patient is apparently well.†

But while the X-ray has not been proved actually curative, its value in alleviating some of the worst symptoms of advanced laryngeal cancer is becoming more and more evident. Pain is relieved by it, and sometimes completely controlled. Excessive secretion and fetid conditions of the growth are done away with, and the progress of the disease has been, in many cases, materially checked. Sufficient testimony is now available to war-

**Journal of the American Medical Association*, December 5, 1902.

†Personal communication.

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rant the assertion that, on the whole, the X-ray has up to the present time proved the best means at our command for the relief of some of the chief symptoms of advanced carcinoma of the larynx. In the earlier periods of the disease the recognized necessity for prompt operative measures has made it impossible for the X-ray treatment to have received fair and extended trial.

6. The suggestion of the use of the ultraviolet and the high-frequency rays in the treatment of laryngeal cancer, and the perfecting of instruments for their application to the interior of the organ, are of so recent date that no results have been reported. With increasing skill and experience in the use of this method, excellent possibilities are in store for it, and it is to be hoped that it will not be abandoned until it has been given an exhaustive trial. Ingenious instruments have been devised for its application.

7. The past year or two has marked the discovery of a new and very interesting agent, namely, radium, the therapeutic uses of which are of the same order as those of the Finsen and Röntgen rays.*

Lupus and superficial epitheliomas have been cured by it, and a number of cases of inoperable carcinoma have been treated with it with considerable success. Exner treated a group of twenty cases in Gussenbauer's clinic with evident improvement in all; while some of the results obtained by Robert Abbe of New York have been remarkable.

Unfortunately, the radium rays, like the X-rays, are not without harmful effects. The rays which inhibit the growth of bacteria inflict considerable damage upon the surrounding tissues. The burns resemble those of the X-ray. No report of the successful application of radium to the larynx has been made.

The physiological difficulties in the way of the direct application of the radiants to the interior of the larynx, and their liability to cause dangerous irritation to that organ, have seemed sufficient practically to eliminate them in the treatment of intralaryngeal cancer. Already, however, an excellent applicator for the violet ray has been made.

Another, for the new Piffard ray has been devised by the writer, while in the new "Lieber Aluminum tube" a successful vehicle for the application of radium to the larynx has been presented.

Thus far the various agents of radiant energy have not been

*Abbe, *Washington Medical Annals*, 1904, Vol. II, p. 363.

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successfully applied to the cure of deep-seated malignant growths.

It cannot be too emphatically stated nor too clearly understood, however, that most epitheliomas of the interior of the larynx are, in the early part of their history, absolutely and distinctly superficial epitheliomas. Now, the agents of radiant energy, without question, can cure and have cured superficial epithelioma; therefore, theoretically, they should cure early epithelioma of the larynx. Just whether they will or not remains to be practically demonstrated. By all means, therefore, let those who are enthusiastic in this direction continue in their meritorious and not unpromising course of inquiry. Success may be nearer than now appears.

Few cases of early epithelioma are operated upon before a week or two has elapsed after the arrival at a positive diagnosis. The application of the radiants during this time could hardly do harm and might give results sufficiently good to warrant its continuance. This suggestion would be especially practical in cases in which operation is refused.

8. Reviewing the above, it appears that but a single resource, namely, the radiants, offers even the possibility of temporary help in laryngeal cancer, and we are reluctantly forced to accept the unwelcome proposition so long familiar to us, that, at the present moment, surgery is the only field which presents any certainty of success in the treatment of these cases. The specific for cancer has not yet been discovered, and until it is found the actual mechanical removal of the disease seems all that we can command.

The endolaryngeal removal of malignant growths has had some strong advocates, among them notably B. Fränkel of Berlin, whose statistics on this subject are interesting. Notwithstanding what has been written in favor of this procedure, the sentiment against it to-day is practically unanimous. Case after case of epithelioma has come to our notice in which attempts at removal of the growth have been surely and rapidly fatal. It may be fairly stated that endolaryngeal methods in this disease have been absolutely abandoned and the attention of the profession has been turned exclusively toward extralaryngeal means.

As with many other new things, the beginnings of extralaryngeal surgery were not encouraging. During the first ten years of its history the average of life was undoubtedly shortened by it. In

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the last fifteen years, however, steady advance has been made toward a better understanding of the operative work, and a fairer appreciation has been gained of its possibilities and its limitations. This is proved by a comparison of the statistics of the past ten years with the older records.

Thus, before 1881, the mortality for forty-one total laryngectomies was 60 per cent.; that for ten partial laryngectomies was 40 per cent., the average for both operations being 50 per cent.

Gluck, who, up to the present time, seems to have had the most successful record, in 1900 reported 34 cases of total laryngectomy for malignant disease, with 31 recoveries from the operation, a mortality from operation of only 8½ per cent. Kocher, in 12 operations of various kinds for laryngeal cancer, had a mortality of 8.3 per cent.; those cured for over three years, 16.6 per cent.; those free from recurrence less than three years, 33.3 per cent.

The diminution in the death rate for the operation of laryngectomy from 1889 to 1900 was from 44 per cent. to 8.5 per cent. The increase in those remaining cured over three years has been from 7 per cent. to 15 or 16 per cent. during the same period of time; while the increase in those remaining free from recurrences for less than three years has increased from 13 to 14 per cent. to 33 per cent.

In thyrotomy, with removal of diseased soft parts, the permanent cures are as high as 44 per cent., while the death rate can be placed at about 11 per cent. Of the patients operated upon by Mr. Butlin nearly 70 per cent. lived for more than three years after operation, while his death rate from operation was 9.5 per cent.

The expression "permanent cure" should be used in this connection with due consideration and fairness. Since recurrence may take place years after the removal of the growth, it is plain that no arbitrary limit of time can be fixed beyond which there will be an absolute certainty of permanent immunity from relapse. One-half, and in some instances two-thirds, of the patients reported alive and well at the end of the first year, have died within three years. Three years is generally considered the minimum allowance of time in which to record a case as one of actual cure. Statistics based upon alleged cures of less than three years' duration are therefore worthless.

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As has been suggested by Hartley,* "The reason for the steady improvement in the results is to be found in the measures adopted to avoid the former frequent causes of death, namely, the aspiration pneumonia and the infection of the cellular planes inclosing the trachea and its extension to the mediastina." Of these measures, the avoidance of general anesthesia, especially by means of ether, and the more frequent employment of cocain, may be mentioned. Kocher has probably used the latter more extensively than anyone else, for the purpose of preventing cough, controlling hemorrhage, and allaying pain. As has long been known, ether diminishes the reflex irritability of the trachea and bronchi and greatly increases the tracheal and bronchial secretions. Chloroform is better than ether, in that it does not induce the same amount of secretion. In other respects, it is open to the same objections as ether. Both, however, induce general anesthesia, a distinct advantage with regard to pain and shock.

To a conscious patient the operation is far from agreeable, and even with all that cocain can accomplish in the way of local anesthesia, the pain of operation under it is very severe. On the other hand, under cocaine anesthesia of the larynx, tracheal and bronchial irritability is not impaired, secretion is diminished instead of excited, and, as has been shown by Crile,* the tendency to a sudden reflex inhibition of the heart and respiration through irritation of the superior laryngeal branch of the pneumogastric nerve is avoided. The application of cocaine to the interior of the larynx is also recommended to define more clearly the limits of the growth.

In addition to greater skill and discretion in the administration of the anesthetics, it has been suggested that much good has been accomplished by the employment of the posture of Maas, later advocated by Trendelenburg and Rose, in which the head and shoulders of the patient are placed lower than the level of the body, to the extent that all fluids gravitate away from the larynx and trachea, and thus the necessity for a preliminary tracheotomy in many of the simpler operations and for the various tampon canulæ has been done away with. With this proposition not all surgeons agree.

N. Y. Med. Jour., Dec. 13-20, 1902.

**Journal of the American Medical Association*, March, 1900.

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Gluck's method, in complete laryngectomy, of dividing the trachea at the level of the upper rings and attaching its lumen forward to the skin, as successfully practiced by Solis-Cohen and Keen in the case of Hickey, has given, according to Hartley, a better proportion of cures than any other device.

The closure of the pharynx from the wound and from the open end of the trachea has been attempted by several surgeons for the purpose of preventing infection of the peritracheal connective tissue in complete laryngectomy, and has given good results.

Such are the reasons advanced by leading surgeons for the improvement in the statistics of the past ten years. In the judgment of the writer, however, certain other factors as well as these have been at work, and it is his desire that these factors should be recognized and appreciated.

1. Recent operators have learned from experience to exercise care in the selection of cases for operation.

2. Through the influence, mainly, of Mr. Henry T. Butlin, great advances have been made in the management of the less advanced cases. This authority has vigorously insisted upon the vital necessity for the early recognition of laryngeal cancer and for its immediate removal as soon as a small intralaryngeal growth, apparently malignant, has made its presence manifest. Mr. Butlin has, therefore, been the earnest advocate of thyrotomy in cases in which the soft parts have been to a limited extent attacked. In cases of more extensive involvement, he performs partial extirpation. His aim, however, is to secure command of the patient before the progress of the disease has included important parts, and thus to rescue him from the peril of a complete laryngectomy. With masterly ingenuity and skill, he has improved the details of his operative work and of the after care of the patient, until his methods are unquestionably the best in use at the present time, as is proved by the successful statistics obtained by his followers and himself. Every point of his technique has been worked out with elaborate care and proved with exhaustive experience. His work entitles him to the highest credit, while his opinions as to the necessity for early radical interference, lately substantiated by the English Cancer Commission, are in harmony with common sense and with the convictions of all good surgeons with regard to cancer in other

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regions. In what he has done he has been ably seconded by Sir Felix Semon. The writings of these authorities, together with the work of Clinton Wagner, of New York, form a brilliant addition to the literature of the subject of thyrotomy for the removal of circumscribed intralaryngeal cancer, and represent the most advanced and reliable knowledge of the day.

3. In studying the statistics of the subject it is found that by far the best records have been made by such men as Butlin, Gluck, Kocher, and von Bergmann. Every one of these is an accomplished surgeon who has had *wide experience in this particular line of work,* whose operations are performed in a hospital, and whose patients are cared for by assistants thoroughly accustomed to the handling of such cases.

Especial knowledge and experience in the management of laryngeal cases is an essential prerequisite to success. General surgical training does not qualify an operator for the major operations upon the larynx, and until this is recognized the best results will never be attained.

Nearly ten years ago the writer urged before the laryngological section of the British Medical Association, the following proposition:* "The time has long passed in which an unsuccessful attempt at laryngectomy by one not fitted for the work can bring anything but reproach to the operator and discredit to the operation. I am strongly of the opinion that, for a time at least, both the welfare of patients operated upon and the interests of science demand that the indiscriminate performance of capital operations upon the larynx should cease. In most great centres there are individual surgeons or groups of operators who are especially well fitted, as to both personal qualifications and hospital facilities, for the successful performance of this work, as has been proved in many cases by the records which they have already made. They must be experienced laryngologists as well as expert surgeons. Let such men surround themselves with the proper assistants, let them systematize their efforts, and use all diligence in the perfection of appliances and methods and in the study of the cases under them, and keep careful and accurate record of everything pertaining to the history of their work. Then resign to them the care of as many cases of laryngeal cancer as possible. When a sufficient amount of material has thus been col-

**Brit. Med. Jour.,* Oct. 26th, 1895.

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lected, we shall learn whether the radical extirpation of laryngeal epithelioma is unjustifiable, or whether, as we have the best reasons for hoping, it is likely to establish for us a reliable means of cure."

The proposition was received with outspoken disfavor by many of those present, and it is rare that one meets a surgeon who will admit the justice of it. Ten years of extensive observation, however, have abundantly confirmed the views which it expresses, and its acceptance is urged to-day with more earnest emphasis than ever. Heretofore, the results of indiscriminate operation have been so bad that their records are unobtainable because suppressed. General confidence in the value of the operation has therefore been seriously impaired, which means that the statistics of the best operators are no criterion whatever of the results of the whole general mass of operative work. It may be set down as an axiom that an inferior operator *never* reports an unfavorable case. Among such operators failure is common, and its sources can easily be traced to distinct violation of well-established rules. Many a patient has died from preventable accident whose life would have been spared if he had had the constant care of a highly skilled watcher. As has been eloquently insisted by Solis-Cohen, such a case should never be entrusted to the *interne* nor to the assistant without experience in such matters, but should have within reach an attendant only less competent than the surgeon himself, qualified to appreciate the special necessities of the patient, and to meet promptly any emergency that might arise. Mistakes hardly short of criminal have occurred in laryngeal operations done by inexperienced men working with absolutely no trained helpers. Small wonder that the reputation of laryngectomy makes slow progress under such possibilities of danger.

My proposition, fair in itself, has been strengthened by the experience of every succeeding year. It is wrong to tell the patient that his chances are 70 per cent. good, according to Butlin or Kocher, and then to operate upon him in such a way as to reduce those chances four-fold.

Special skill, special experience, and special equipment are sure to give the best results. Time and the necessity for keeping to the subject in hand forbid any discussion of the question of special hospitals. I have long believed, however, that in the care

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of laryngeal cases our present hospital system was defective in the arrangement of the medical staff, and that the highest perfection could only be attained by the surgeon who had under him a resident surgeon-in-charge with a permanent specially trained assistant and nursing staff. Some of our foreign associates have already set the example in this direction. In it, or something approaching it, will be found one of the main secrets of their success. The brilliant surgical results obtained at the Mayo Sanatorium, in Rochester, Minn., furnish an apt illustration of the idea in mind. Nowhere, however, is it likely that it is so well exemplified as in the hospital of Kocher, the great Swiss surgeon, whose operations upon the neck, including over 1,500 cases of goitre, have given him and his attendants unrivaled experience in the surgery of this region.

There are several other considerations which tend to the safety of the patient, and therefore to the success of operative work, especially in complete removal of the larynx. An important factor will be the personal characteristics of the patient himself. Account must be taken of his age, vitality, and general physical condition; of his temperament, his intelligence, and finally of his station and surroundings in life.

Age, absolute or relative, will shorten the natural expectation of life, and thus detract from the value of even a successful operation. It is less desirable to inflict such an ordeal as laryngectomy upon one whose days are already numbered, than upon one to whom a fortunate operation may bring years of usefulness.

Again, upon the assured vitality of the patient will depend not only his immediate recovery, but the success with which he will ultimately rise above the physical depression incident to such a severe surgical measure. It would be instructive to know in how many of the cases of the disease in which death has occurred without recurrence within a few years after laryngectomy, the fatal issue had been largely due to the general effect of the operation.

Perfection of the physical condition in general and of certain organs in particular, will add greatly to the prospect of success. Thus, on the contrary, certain impaired conditions of the heart or lungs will increase the liability to pneumonia, and other almost necessarily fatal complications; bronchial irritation of any kind,

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accompanied by cough and expectoration, will seriously affect the patient's comfort, and dangerously interfere with the successful progress of the cervical wound; gastric disturbance is an unfavorable condition, as will readily be believed by anyone who has seen the effect upon a recently operated case of a single attack of emesis, or of continued indigestion.

There are a number of cases on record in which the subject of a so-called successful laryngectomy has committed suicide; nor can we wonder that the ordeal of the operation and of the period of convalescence, the physical deformity incident to it, the impairment of the power of speech, the social ostracism of the higher order of man, and the physical incapacity of the lower, should call for rare equanimity and almost superhuman moral courage. The temperament of the patient therefore may easily become the determining factor in the success or failure of the result, while upon this, and upon his surroundings, and the intellectual ability to adapt himself in the most satisfactory manner to the latter, will depend the toleration with which he will meet his life. Unquestionably, laryngectomy should not be performed without a full understanding on the part of the patient and his friends of the nature of the operation and of its results. The remarks just made refer to complete extirpation of the larynx. The ultimate results of partial laryngectomy are, of course, far happier than those of the complete operation, and the resulting physical condition of the patient is infinitely better in every respect.

In many of these cases the patient has been able to engage in his usual occupation, even when that has required persistent use of the voice, nor has he been debarred from the various pursuits and recreations to which he was formerly accustomed.

There are certain practical points to which I wish to call attention. Excessive secretion in the mouth and pharynx has often been a source of annoyance and even of grave danger during the first few days following laryngeal operation, and it may become important to use effective means for its control. While some surgeons doubt the value of drugs in this connection, the writer has several times during the past ten years seen excellent results follow the administration of belladonna. Under small physiological doses of this remedy, the secretions will in some cases cease. The method is simple, little harm can come from it, and the end to be gained quite justifies the expedient.

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Another matter which demands attention is the early diagnosis of malignant disease, and especially its differentiation from syphilis. The two conditions are constantly mistaken for each other. It must be remembered that laryngeal cancer may not only simulate tuberculosis or syphilis, but that it may actually co-exist with either of them. Most frequently syphilis is mistaken for cancer. Time and again cases are sent for advice as to operation for the removal of a supposed cancer, when the administration of a course of the iodide of potassium would result in a speedy cure. So often does this occur and so easy is it to fall into this error, that the writer believes it imperatively necessary in every doubtful case to exclude the possibility of syphilis by a trial course of the iodide. When this simple measure has been neglected, more than one easily curable case of syphilis has come to the knife. With regard to prognosis, it seems impossible, in many cases, to judge from the appearance of the growth whether its progress is likely to be rapid or slow.

The question of the best means for supplying vocal power to the subject of a laryngectomy has been much discussed. The various forms of artificial larynx, so-called, have been failures. Their whistling tone is always of such quality as to render the wearer an object of remark, if not of derision. The apparatus is uncomfortable and annoying to the patient, and its presence exercises an irritating effect upon the adjacent parts at a time when such irritation may easily excite a return of the original disease. Far better, when all semblance of the natural voice has been lost, are the results gained in Solis-Cohen's celebrated case (Hickey). The splendid work lately accomplished by Hartley, of New York, in this direction marks a genuine advance, and, well deserves to be recorded. As soon as possible, after the patient has recovered from the operation, he is placed under the instruction of an experienced teacher, through whom he acquires the art of communication by audible sounds, the latter generated entirely above the region of the larynx.

Questions relating to preliminary tracheotomy in operations upon the larynx have never been satisfactorily discussed. While certain of the best surgeons hold pronounced views upon the subject, it would seem that their opinions are sometimes more radical than the facts warrant.

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1. Is preliminary tracheotomy a necessary measure in the radical treatment of laryngeal cancer?

2. If required, at what time, with relation to the major operation, should it be performed?

The necessity for a preliminary tracheotomy is now not universally conceded, many operators dispensing with it in certain cases. Murray* and Butlin maintain that it prevents the entrance of blood and septic matter into the trachea during the operation, and at the same time admits of the continuous and convenient administration of the anesthetic, thus permitting a complete and satisfactory operation. In the more restricted operations, the employment of posture has largely done away with the necessity for tracheotomy.

More important than the above, because less understood and appreciated, is the vital question as to *when,* with relation to the major operation, the preliminary tracheotomy should be performed. Many surgeons, including Mr. Watson Cheyne, advocate the insertion of the canula immediately prior to the main operation, on the ground that the patient is thus saved the anxiety and shock of two separate procedures, and because, as it is claimed, no special advantage is likely to be derived from its earlier application. It is also asserted that early tracheotomy subjects the patient to the danger of septic infection from the tracheal wound, and the tracheal wound itself to the danger of infection from the malignant growth.

In the case of operations upon the tongue, jaws, or pharynx, this may possible be true. In operations upon the larynx requiring tracheotomy, however, there is no doubt that many of the symptoms are essentially different from those present in the procedures mentioned above, and that for special and important reasons the plan of operating must be so conducted as best to meet them. The conditions referred to affect not alone the convenience of the operator and the mere comfort of the patient; they are based upon important physiological, pathological, and surgical facts. Upon the intelligent treatment of them will often depend the success of the case and even the life of the patient.

In a paper read before the laryngological section of the British Medical Association in 1897†, the writer says:

"Of the physiological conditions which distinguish extensive

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†*Brit. Med. Journ.*, Nov. 14, 1897.

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operations upon the larynx from those performed higher up in the air passages, the most important is the close proximity of the pneumogastric and the recurrent laryngeal nerves to the site of the wound. Just how much influence upon the successful progress of the case may be exerted by injury to these important trunks during operation or through irritation to them afterward from some of the various accidents of inflammation which may follow, it is difficult to say. Doubtless, if the history of past cases of laryngectomy could be fully understood, much interesting and valuable information on these points would be developed. As a field for study, it is now an open one. There are many cases, however, in which the symptoms of phrenic irritation seem to have been distinct, and not a few others in which obscure symptoms would probably have found their explanation in it."

The recent investigations of Crile have scientifically demonstrated the truth of the writer's suggestions upon this subject, and have placed the matter entirely beyond dispute.

With regard to the actual insertion into the trachea of the canula itself, it goes without saying that the irritation of this and other neighboring parts will be more severe immediately after operation, and that with the lapse of time the tolerance of the patient to the tube will be greatly increased.

More important even than the above are the changes which the wearing of a tracheal tube necessitates in the physiology of respiration. The sudden elimination from the process of breathing of almost the whole of the upper air tract with all which that implies, the exposure of the trachea and bronchi to air thus deprived of suitable preparation for its reception to the lungs, and, finally, the sudden increase in the amount of oxygen in cases in which preëxisting stenosis has been severe—all tend to disturb the general equilibrium of the patient and to cause, locally, a greater or lesser amount of annoying or even dangerous irritation.

It is highly desirable that at the time of the major operation the patient be relieved of as many as possible of these complicating factors.

Another consideration of interest in this connection is that, in performing an early tracheotomy, the changes of respiration are assumed at a time when the patient is in a quiescent state and

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when, being mentally and physically less disturbed than it is likely he could be after the major operation, he can with the least physiological irritation and the maximum convenience to himself, acquire a sufficient knowledge of the mechanism of the tube, the peculiar management which it requires, and the effect of its use upon himself. The value of this preliminary experience has often been underestimated.

The performance of an early tracheotomy is thought by some to subject the patient to the danger of septic infection from the tracheal wound. While this might be possible when the canula is inserted within a few days before the laryngectomy, it does not follow that it will take place if the tracheotomy be performed at a time sufficiently long before the former to allow the tracheal wound to be tolerably well healed. Septic infection or pneumonia, if either were to develop after the subsequent operation could hardly be due to the influence of the tracheal wound if the latter had passed the stage in which infection is likely to occur.

That the tracheal wound itself may become infected from the diseased area in the larynx, is another objection urged by certain surgeons. In the experience of the writer and of many other observers, such infection is of very rare occurrence, only taking place in advanced stages of the disease when infection has become general from widespread extension of the disease outside of the larynx. Infection of the tracheal wound from a circumscribed intralaryngeal growth is an almost unheard of accident, and while its possibility is not questioned, the fact that it has often occurred is denied.

The writer believes, therefore, that the objection to early tracheotomy on this ground is purely theoretical, and that it is not sustained by clinical fact.

Again, the general condition of the patient suffering from progressive laryngeal stenosis is invariably less favorable than when normal respiration is possible. The restoration of a sufficient supply of oxygen to the system is sure to be followed by improvement, especially in the anemia, malnutrition, and depression which are generally present. In this respect, therefore, the preliminary operation is of great value as preparatory to the successful issue of the later one.

The effect of laryngeal stenosis upon the bronchial mucous membrane is, of course, irritating, and, especially in cases in which

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the dyspnea has existed for some time, bronchitis is often present. This will be materially benefited by the free admission of air to the lungs and by the generally improved tone of the system which follows tracheotomy.

Finally, in all cases of inflammatory disease of the larynx, the severity of the symptoms is increased by the physiological use of the organ. The state of quietude which follows tracheotomy, from the consequent abolition of the respiratory movement of the larynx, is almost always accompanied by improvement in the local condition which may advance for several weeks. The advantages of this at the time of the main operation are obvious, and, in cases in which the congestion has been such as to make it difficult to distinguish between diseased and healthy parts, are sufficient in themselves to warrant the loss of a few days' time.

Several of the surgical advantages of early tracheotomy have been generally recognized. Thus, much valuable time is saved at the performance of the latter operation; the patient is spared a certain amount of shock, and possibly hemorrhage; and the undivided attention of the operator can be concentrated upon the task which confronts him in the removal of the larynx.

Lastly, in that method of complete laryngectomy practiced by Keen and Glück, in which the severed end of the trachea is turned forward and fastened to the edges of the external incision in the neck, the adhesion which has already taken place after a previous tracheotomy between the trachea and the wall of the neck, becomes of greatest assistance in holding the trachea firmly in place.

When there has been no early preliminary tracheotomy and when, in consequence, the edges of the trachea must be stitched to the cervical wound, the free movement of the trachea in respiration makes it practically impossible to keep the parts properly together. In many such cases union has not taken place, the operation has been a failure, and the patient has died.

Early preliminary tracheotomy certainly possesses advantages which should claim for it our careful attention, in spite of the number of those who hold it in disrepute. On the whole, in properly selected cases it is without doubt a valuable measure.

In conclusion, it will appear from the foregoing article that the present time marks a distinct advance in the treatment of laryngeal cancer.

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For inoperable cases, palliative means hitherto unknown, have amply proved their efficiency. For certain advanced cases, formerly hopeless, the work of Hartley and others has demonstrated a fair measure of success.

For the cases recognized early and promptly operated upon by those best qualified to do so, the methods taught by Mr. Butlin have yielded results which may well be ranked among the chiefest triumphs of modern surgery.

Meanwhile, we look earnestly forward to the thrice welcome day when surgery may be laid aside in view of the discovery for cancer of a specific cure.

Discussion.

Dr. E. FLETCHER INGALS was thoroughly in accord with the advice given by the author ten years ago, that if a laryngectomy is to be done it should be done by some one especially qualified to do it. Certainly the majority of laryngologists are not qualified, as they have other kinds of work to do and cannot afford to take the time to become experts in this work. He considered himself entirely unqualified for this work. About two years ago Dr. Ingals became convinced that laryngectomy was advisable in two cases of laryngeal cancer. Before that time he did not remember to have advised this procedure excepting in one case. The two cases referred to had the operation performed after the Luc method; that is, stitching the trachea to the edges of the wound in the skin. In one of these cases a preliminary tracheotomy was done by Dr. Ingals; in the other no tracheotomy was performed. Dr. Ingals believed that both the surgeons operating on these cases preferred to do the operation without preliminary tracheotomy, although he was not sure this statement is correct. He was much impressed with the late Dr. Fenger's statement, made at the time of the operation, that if the condition were altogether intrinsic, that is, if the cancer had not passed the laryngeal wall, there was a good chance for recovery; whereas, if it had perforated the wall the chances were very meagre. In the case upon which Dr. Fenger operated the malignant growth showed itself a little beyond the walls of the larynx, but fortunately there had been no infection of other parts. Both cases did well, but it is stated that the one in which a preliminary tracheotomy had not been performed seemed to do better than the other one. Both these patients are living and talk very well. In neither of them can any air be forced through the mouth. One of them has used an instrument whereby he forced the air back through the nostril into the naso-pharynx, thus enabling him to speak fairly well, but it caused so much annoyance that the pa-

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tient preferred to do without it. The other patient made a business of learning to talk with the mouth alone, and had succeeded so that now almost everybody can understand him. He can make himself understood several feet away, when necessary. He speaks in quite a loud voice, although it requires considerable physical effort.

Dr. Ingals considered it remarkable that either of these men can talk. He felt satisfied that he did the right thing in recommending a laryngectomy. Neither of the patients had the distressing post-operative symptoms which he had expected, and both were discharged from the hospital within about six weeks after the operation.

Dr. H. L. SWAIN felt that in taking away a person's larynx one was removing one of his most valued possessions. He considered the fact that the two patients whose cases were reported by Dr. Ingals can talk, as an instance of the wonderful way in which Nature surmounted difficulties. It was stated that the men in New Haven were the first to follow Solis-Cohen's example in the method of operating upon a case in which the larynx was removed. This patient was also able to talk. Dr. Swain mentioned a case in which he recently had to decide whether or not there was cancer present, and whether to advise the removal by thyrotomy or by a complete laryngectomy. A thyrotomy was done, the operation being the same as that reported to the Association by Dr. Chappell last year. Six months had now elapsed since the operation without any return of the condition, and the patient, a minister, had voice enough to preach again if he wished so to do. The cancer in this case was intrinsic. There was no preliminary tracheotomy performed, nor a tracheotomy tube left in after operation. Except for a stitch abscess there was an uneventful recovery. Dr. Swain wished to make it clear that he was not the operator in this case, but was on hand during the operation. He would like to ask if the man presented before the Association last year by Dr. Chappell still remains well.

Dr. Chappell replied that he was still very well, and that there was not the slightest evidence of recurrence, and that in two months' time the patient would have passed the three year limit.

Dr. JOHN N. MACKENZIE thoroughly agreed with Dr. Delavan's remarks regarding the use of the X-ray in the treatment of cancer of the larynx. It is at present an uncertain method of procedure. On the other hand, its use in the pharynx seems to offer much greater prospect of relief and cure. He cited a case of inoperable cancer of the pharynx and soft palate in which complete cicatrization occurred. The patient, a young lady of about 30 years of age, from Chicago, was found to have well-marked epithelioma of the soft palate and posterior wall of the pharynx, with little spots of infection here and there on the lateral wall. The case was inoperable and, therefore, Dr. Mackenzie advised

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the patient to return home and put herself under the care of Dr. Pusey. This was about two years ago. She took his advice, and about ten months later, when again seen by Dr. Mackenzie, the cancer of the soft palate had been greatly helped, there was perfect cicatrization, and the posterior wall was covered with a large scar. But, while the X-ray had completely succeeded in the upper pharynx, the infection had spread along the lateral wall deeper into the pharynx, and could be traced by small mount after mount of cancerous nodules, until it reached the epiglottis. which was enormously swollen and infiltrated. Nothing could be done except palliative measures. The case was referred to as an instance of the adapability of the X-ray to the pharynx.

Dr. Mackenzie was also strongly of the opinion that laryngectomy should only be performed by the general surgeon, the one most used to such work, and thinks this question should now be eliminated from further discussion. The average laryngologist was not competent, in his mind, to do operations of this class, and they should be given to the general operator.

Dr. Mackenzie, in closing, said that, while time did not permit a review of the relative merits of the operations done for laryngeal cancer, he might say, in passing, that in his judgment the risks of thyrotomy were too many and too great; that it was a dangerous game, in which both surgeon and patient took the gambler's chance. More hazardous still is the attempted removal of the disease through the mouth. Indeed, he hoped the time was not far distant when the question of the intra-laryngeal extirpation of cancer, by the methods now in use, would disappear completely and forever from this forum of debate.

Dr. W. K. Simpson considered that much credit was due Dr. Delavan for bringing this subject up to date, and he agreed with him and with Dr. Mackenzie in their respective statements. He believed that it was the province of the meeting to reiterate the importance of having these operations done only by qualified men. He was convinced that the average laryngologist was not capable of excising the larynx for cancer. In all the failures he had ever seen, he believed that the greatest cause of ill success had been the lack of attention paid to technique, even on the part of good general surgeons. How much more this failure would be apt to occur to the majority of those whose work was not in this line was very evident. He cited a case in which a small laryngeal growth was removed from the centre of the cord. The growth was intrinsic and the operation was most simple. The patient was operated on by a most competent surgeon. The operation was one of laryngo-fissure and a tracheotomy was done at the same time. Two days after the operation the patient developed a pneumonia and died. The case was referred to in order to show how very serious was the lack of attention to technique, even in the most simple operations.

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Dr. WILLIAM LINCOLN believed that these cases should be seen early, and that it was wiser to take the risk of operating early in a case where malignancy may not be absolutely established than to allow the case to progress until malignancy is absolutely certain. It was considered best in these cases to err upon the side of early operation. In relation to treating these painful cases by other means, Dr. Lincoln spoke of the X-ray, which had already been mentioned by Dr. Delavan and others. He referred to the only case in his experience in which the agen was used under the direction of an X-ray specialist. This method was taken as a last resort, and there was no result for good. It did not increase the comfort of the patient, but it did decided damage to the larynx and surrounding parts by the persistent treatment. The X-ray was used exactly as the specialist directed, with sufficient frequency, but with care not to affect the skin. Notwithstanding the precautions taken and the fact that the laryngeal growth was not of sufficient size to cause any pressure, the entire epiglottis and both wings of the thyroid cartilage sloughed and came away. Dr. Lincoln believed the constant application of the X-ray in this case was responsible for the damage. The patient died of a pneumonia. Reference was made to his thesis of last year, in which he reported seven cases operated upon by Dr. Crile, all of which were desperate cases. The absolute promise of cure was not given to any of these patients, and the operation was undertaken with the understanding in every case that it was to relieve the pain and discomfort. All of these cases, although of long standing, were, with one exception, relieved of many weeks of suffering. One case was completely cured.

Dr. G. HUDSON MAKUEN desired to be informed regarding the application of the X-ray in these cases, whether it has been made through the mouth or through the tissues of the neck.

Dr. Delavan, in closing the discussion on his paper, replied to Dr. Makuen's inquiry regarding the method of application of the X-ray, saying that it had been very conclusively proved that the more superficial the growth the better the prospect of relief. Deep-seated growths, however, have been materially benefited by the application of the X-ray. He believed that this agent should be resorted to in cases of inoperable extra-laryngeal cancer. In the treatment of laryngeal cancer the X-ray had been used entirely from the outside. Dr. Delavan had seen a number of cases of inoperable tumors of the neck in which the X-ray had been used, and in which it had been of the greatest possible value in relieving suffering.

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FINAL HISTORY OF A SUPPOSED CASE OF VOCAL NODULE; EPITHELIOMA OF THE LARYNX; THYROTOMY; DEATH.

BY CHARLES H. KNIGHT, M.D.

At a meeting of this Association in 1901 I read a paper entitled "Vocal Nodules," suggested by a supposed case of that disease, the history of which was given in detail. The outcome of the case was so unexpected and in many respects so instructive, that it seems desirable to place on record its subsequent history.

At the time of my first report laryngeal symptoms had been present more than a year, although the "nodule" had been discovered only about nine months previous. During the summer of 1901, the following winter and the summer of 1902, every effort was made to give the patient the benefit of the best possible surroundings, and the local treatment was restricted to the use of sedative and mild astringent sprays. The voice continued hoarse, with occasional intervals of partial recovery, until aphonia became practically permanent. In October, 1902, the "nodule" had increased slightly in size and prominence, but there was no obvious infiltration of the vocal band or loss of power. There was no pain and there were no glandular enlargements. The patient was extremely discouraged, in spite of decided improvement in general condition. Incidentally it may be mentioned that from the first she was possessed with the notion that she had cancer and could not be cured. She would be reassured, but now and again reverted to the idea. At about this time she saw several of my colleagues, one of whom removed a fragment of the projecting mass with a cold wire snare.

The microscopic examination of this fragment, about one-sixteenth of an inch in thickness, made by an experienced pathologist, showed that the tissue was composed almost solely of epithelial cells, having the appearance of papilloma. The arrangement of the cells gave no evidence of rapid growth. So little sub-mucous tissue was present that no accurate idea of the depth of the cell layer could be formed, but no indications of invasion of the submucosa were seen. The microscopic diagnosis was

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"papilloma of larynx—malignant tendencies." The latter was based on the following three features: 1. Unusual amount of chromatin in the nuclei. 2. Concentric arrangement of cells in whirls or groups of ten or twelve. 3. Some cell inclusions resembling those seen in carcinoma.

There followed an excessive degree of reaction, which did not subside. The vocal band became swollen and red, and the neoplasm showed a tendency to creep toward the anterior commissure. Accordingly it was decided to do a laryngo-fissure, and let further interference be subject to the state of things thus disclosed. On Dec. 7, 1902, a thyrotomy was done in the most skillful manner by one of our leading surgeons. Pieces of affected tissue were removed and at once submitted to an expert microscopist, who, after having examined several sections, pronounced the lesion an epithelioma, all the sections showing "extensive infiltration." On the strength of this finding all the soft tissues, including the arytenoid of the right side of the larynx, were resected. The cavity was left open, packed lightly with gauze, a long tube having been left in the trachea, and the patient was removed from the table in most excellent condition. She was left in charge of two experienced nurses with every appliance at hand to meet emergencies, and one of the House Staff remained with her until after complete recovery from the ether. The operation itself was free from complications and was rapidly done, having been interrupted for about fifteen minutes while the microscopical examination was in progress. The patient passed a quiet afternoon, except for some restlessness at first, and finally fell asleep. Toward evening she suddenly awakened, sprang up in bed gasping for breath, became cyanosed, and presently fell back unconscious. The nurse called a surgeon, who reached the bedside almost instantly, at once extracted the trachea tube, did artificial respiration, and resorted to every possible means of resuscitation without avail.

The operating surgeon has courteously placed at my disposal the following comments: "Whether her death was due to a slipping of the tube from the trachea or to pulmonary embolism I am unable to say. I am inclined to believe the former, although both nurses state that up to the moment of her apparent suffocation she had been sleeping quietly, had not coughed, and had made no unusual effort which would have been likely to displace the tube. Moreover, shortly after her return to her room she had vomited slightly, and had coughed at intervals, without producing such a result."

This case enforces certain lessons that have often been taught, and unfortunately it brings us no nearer the solution of several questions many times asked:

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(1) The stimulation to activity of malignant disease has been repeatedly noted. Here it was especially marked. We should always be prepared for this event and, if possible, have the full consent of the patient to resort to whatever further operative procedures may seem advisable.

(2) The testimony of the microscope is not to be depended upon unless the whole thickness of suspected tissue can be secured. Numerous cases are on record in which the microscope has antagonized the clinical history, and others in which a microscopic diagnosis has not been verified. It is seldom possible to obtain a satisfactory specimen by means of forceps passed through the mouth.

(3) The question of transformation of a benign growth into one of malignant character has apparently been decided by statistics in the negative, yet the fact remains that in this instance the appearance and history of the lesion continued absolutely benign for more than two years. In many cases a much longer period of quiescence has been observed. There was nothing whatever in the course of the disease to justify a suspicion of malignancy until after the use of the snare. It is not supposed that the latter did more than excite the virulence of the morbid process.

(4) We are still in the dark as to positive signs by which to identify malignancy at its inception. Was this growth benign at the outset, and if so when did the malignant change occur? At present the only way in some cases in which to determine the character of a doubtful laryngeal lesion is by its complete exposure through an external wound, and even then, in the words of Butlin, "it may be difficult to say what the nature of the disease is." The picture in the laryngeal mirror is often indecisive as to the character of a lesion, and misleading as to its extent. Almost always on splitting the larynx we find much more territory involved than was previously suspected. The prognosis in *intrinsic* cancer of the larynx is perhaps more favorable than that of malignant disease in almost any other region of the body, yet our guiding principle here, as elsewhere, should be early operation, to include by a wide margin every vestige of morbid tissue.

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Discussion.

Dr. J. N. MACKENZIE wished again to enter a protest against the indiscriminate removal of portions of a supposed cancerous growth of the larynx for microscopic examination before all other means of clinical diagnosis had been resorted to. He wished to reaffirm his objection to such a procedure, on the ground that it at once opens up an avenue of auto-infection at the point of incision and to metastasis elsewhere, besides stimulating the local growth of the cancer. The latter result is strikingly apparent in the case of Dr. Knight. As a further illustration of the point at issue, Dr. Mackenzie instanced the method of treatment of laryngeal cancer carried out in his earlier days at the Golden Square Hospital in London, which consisted in the performance of tracheotomy and the subsequent removal, piecemeal, of the laryngeal neoplasm through the natural passages. By this process, which to-day in enlightened surgical communities would be regarded as slow murder, the patient became naturally worse and worse, and died much earlier than if he had been let alone.

Dr. Mackenzie also referred to the difficulties in the way of the microscopic diagnosis of cancer of the larynx, and to the possibility of the surgeon being misled by his pathologist, and emphasized the importance of accepting as final only such testimony as came from an expert specially versed in the histological differentiation of tumors.

Dr. Knight's case again brought out the fact that it is impossible to limit the area of the disease either laryngoscopically, after thyrotomy, or even after the removal of the larynx itself.

Dr. D. BRYSON DELAVAN said that he had had the privilege of seeing the case reported by the author in its early stages, and at no time during that period was there the slightest sign of malignancy about the growth. It was distinctly, so far as all macroscopic evidence went, a benign growth. An attempt at removal of a fragment was not made until it was known that something serious was developing many months after the growth was first observed, and then operation was contemplated and was almost immediately performed. When the growth was removed at the time of operation and sent to the microscopist Dr. Delavan was present and saw under the microscope a typical epithelioma.

With regard to the question of qualified microscopists, he believed that at the present time there were good microscopists connected with a great majority of the larger hospitals in this country, and that while errors of diagnosis might occasionally arise, they were in fact infrequent. He spoke in terms of praise of the equipment and management of the pathological departments of our American hospitals, and challenged comparison between them and the best in the world.

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Dr. CORNELIUS G. COAKLEY in this connection mentioned a case seen by him the past winter. On the evening of the day before the patient was operated upon there was a large globular mass in the aryepiglottic region extending into the larynx. The patient was an Italian woman. Several men on the staff of the hospital who inspected the larynx decided that the growth was malignant, and all advised operation. It was decided to first do a laryngeal fissure, remove a portion of the growth and have it examined by frozen section. The operation was done as indicated, a small piece of the growth being removed. The pathologist reported it to be epithelioma. The operation was therefore continued and a large suppurating mass was entered, but on the strength of the pathological report half of the larynx was removed and the patient made an excellent recovery. A subsequent pathological examination, after proper hardening, of the specimen removed, however, proved it to be a gumma.

Dr. W. K. SIMPSON did not believe that there were any hard and fast rules to follow in determining what to do in the diagnosis of cancer of the larynx. He meant this to apply to the early appearance of the disease. He differed from Dr. Mackenzie in that he thought the removal of portions of the growth justifiable. If, for instance, a suspicious growth appeared on the middle part of the cord he saw no reason why it should not be excised by the intra-laryngeal method, since this could be so easily done. If the growth proved to be benign no harm was done, and if malignant then the procedure was clear. He was firmly of the opinion that excision of a portion of a growth was, if carefully done, perfectly justifiable.

Dr. A. LOGAN TURNER of Edinburgh (by invitation) believed that there were certain points on which all agreed with regard to cancer of the larynx, while there were of course others on which all differed. He believed all were agreed that early diagnosis is essential, if one wishes for success in the treatment. The other point of agreement is in regard to microscopical examination. If a portion of the growth is put under the microscope and said to be malignant, well and good; but if the microscopic evidence is negative, it should not be taken into consideration. That is to say, if one thinks clinically the growth is malignant he should not be encouraged by the negative examination with the microscope.

He spoke regarding the treatment instituted by the British School, as represented by Dr. Felix Semon and Mr. Butlin. He appreciated what Dr. Mackenzie had said upon this subject of treatment, but was nevertheless convinced that these English surgeons had facts and very excellent statistics to uphold their method. He stated that last year at Swansea there was a discussion upon malignant disease of the larynx introduced by Sir Felix Semon, reporting some of his most recent results and those of Mr. Butlin by thyrotomy, and Dr. Turner believed one could not

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help but be impressed by the satisfactory results obtained from treatment of this kind. He thought there were about eighteen cases, and that recurrence was rare after thyrotomy. At this meeting at Swansea, Professor Gluck of Berlin brought a most interesting series of cases before the profession, presenting the material removed and two patients upon whom he had operated. These cases showed the other extreme of operation, as the whole larynx and the lymphatic glands had been excised.

It was Dr. Turner's belief, however, that if cases of intrinsic laryngeal disease were seen and diagnosticated early they could be cured by thyrotomy, and that so far as the English surgeons have figures to show in this respect he did not believe anyone is justified in doing the major operation.

Candidate's Thesis.

AN OPERATION FOR THE CORRECTION OF EXTERNAL DEFORMITIES OF THE BRIDGE OF THE NOSE.

BY T. PASSMORE BERENS, M.D.

THE bridge of the nose is composed of a bony arch supported, or partly so, by a column. The crura of the arch are formed by the nasal bones and the nasal processes of the superior maxillæ; the latter are important factors in the formation of the arch, and in many skulls form at least half of the crura. The nasal bones articulate with each other, with the perpendicular plate of the ethmoid on which they rest by means of the vertical spine, with the frontal bone and with the superior maxillary bones. The "grain" of the bone of the nasal processes of the superior maxillæ runs upward and outward, or nearly straight upward. This fact is of considerable surgical importance, as it explains in part why fractures of the bridge of the nose rarely extend internally to the line of the face. It is useful surgically because it permits the bone to split in a straight line, or nearly so, when subjected to the proper measures, the resulting fragments being of use in the rebuilding of the crura of the arch, or permitting of a splitting-off of the crura from the maxillæ and allowing of their replacement in a desired position.

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The supporting column of the arch of the nose, the nasal septum, consists of the perpendicular plate of the ethmoid above, the vomer below, and the triangular cartilage anteriorly The perpendicular plate of the ethmoid at its articulation with the nasal bones is frequently, almost always, involved in deformities of the nasal bridge; and it is important to remember the anatomical relation it bears to the cribiform plate of the ethmoid. A study of the perpendicular plate of the ethmoid bone in the dried skull shows it possessed of no grain, being a plate of compact bone, liable to split in almost any direction were sufficient force applied without due caution. The anterior border of this plate, as well as its posterior superior border where it goes to form the Crista Galli, is much thicker than in its central portions, where it is quite thin. The distance from its anterior end, just beneath the anterior ends of the nasal bones backward and upward to the perforated plate, varies in different skulls, but in twenty-five adult skulls examined ranged from 1 to 1¼ in. This distance is divided nearly equally by a perpendicular line drawn through the naso-frontal angle. The importance of these measurements is considerable and should be borne in mind when operating in this locality, for force applied laterally at a depth in the nose beyond the naso-frontal angle, while perhaps not causing fracture into the perforated plate, might readily enough cause a dangerous inflammatory action in the branches of the olfactory nerves and their accompanying vessels. With this point borne in mind, for the purpose of this paper the nasal septum may be spoken of as a cartilaginous and bony wall, of use in its anterior portions in certain conditions to support and give strength to its super-imposed structures.

External deformities of the nose of traumatic or congenital origin may be divided ino three classes: those dependent on distortions of the cartilaginous portion, those of the bony portion and the many combinations of these two conditions. This paper does not deal with the first class. The last two classes may be further divided into concave deformities, saddle noses, deflections of the whole nose, angular deformities and convex deformities or humps. These broad classes frequently are modified by the presence of more than one deformity. For instance, one nasal bone may have been fractured and depressed, while its fellow may have been bent outward; or both nasal bones may have

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been dislocated from their articulations, depressed and pushed to one side. In either case the result is a deflected bridge, flattened and broadened. If, in addition, the cartilaginous part of the nose has remained in the median line or been pushed to the opposite side, there results also an angular deformity, the combination being very unsightly. Varying from this complex condition to the simple dislocation of the whole nose from its root obliquely outward to its tip are many variations and combinations of displacements.

The first class, that of depressed bridge, usually takes one of two forms, viz.: depression from separation of the nasal bones where each bone has been turned outward, or depression from a crushing or overlapping of these bones. In both cases the perpendicular plate of the ethmoid has been either bent or fractured, or both, in at least part of its extent, and in many cases the nasal processes of the superior maxillæ have also been involved. Necessarily there are many combinations of these two classes, and the result is a great variety of deformities. The most common variety, however, in the writer's experience is caused by an unequal crushing and spreading of the nasal bones, with involvement at least on one side of the nasal process of the superior maxilla.

The second class, that of deflection of the bridge, may also be divided into two classes, that from a displacement laterally of the whole bony framework, or that from an unequal displacement without crushing of the crura of the arch, resulting in a displacement of one crust outward and its fellow inward, giving a particularly well-marked angular deformity with a hump on one side of the bridge. In all of these cases there is more or less participation of the cartilaginous portions of the nose, especially of the septum, in the deformity. Deformity of the bridge of the cartilaginous portion of the nose generally is given its character by the direction taken by the upper anterior edge of the triangular cartilage, for when this edge is depressed or deflected the soft parts follow closely the depression or deflection.

Procedures for the correction of fractures of the nose have been in use from the earliest times. Hippocrates (Wright, "The Nose and Throat in Medical History") gave instructions of great value for the correction or setting of recent fractures of the nose. In recent times much has been written on the same subject and on

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the subject of deformities resulting from neglected traumatism to the nose, but so far as the writer is aware, Roe (*New York Medical Record,* July 18, 1891) was the first to publish operations for the correction of external nasal deformities by subcutaneous methods without insertion of mechanical devices. In an article by Weir (*New York Medical Journal,* October 22, 1892) mention is made of the use of a chisel in the inside of the nose to loosen the nasal bones from their attachments, but preference is given by him to a method requiring preliminary incision through the integument; while Roe, in the article referred to, gives preference to the internal route; and in a later article, "The Correction of Nasal Deformities by Subcutaneous Operations" (*The American Medical Quarterly,* June, 1899), described subcutaneous operations for many deformities, both of the hard and soft parts of the nose. The results obtained by Roe are almost ideal, and give his operations pre-eminence over the older operations by the external route.

Paraffin injected beneath the skin is a valuable procedure in a great number of deformities, especially in those cases where there is loss of tissue from disease ,as, for instance, in the saddle-nose of syphilis. It is useful also in aiding the surgeon to fill up or round out the contour of the nose in certain deformities of traumatic origin. It certainly is a valuable method for filling up deficiencies remaining after the correction of the bony deformities, and in many instances seems to the writer preferable to the somewhat difficult task of transplanting tissue by Roe's subcutaneous methods. It is inapplicable, however, in many of those cases of nasal deformity depending in large measure for their unsightliness on various displacements of all or part of the component parts of the nose; for instance, lateral displacements, curvatures of the nose, or angular lateral deformities.

In *The Laryngoscope* (March, 1899) the writer, under the title, "The Rebuilding of a Nose Without the Use of an Artificial Bridge," described a successful operation performed without incision for the elevation of an old depressed fracture of the nasal bones. The brilliant results obtained by Roe, together with the encouragement derived from the success in the case of the writer, and the subsequent success obtained in a series of similar cases, may be accepted as a sufficient excuse for the description in detail of the technique of an operation not perhaps

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new, but embodying some points at least not made clear in the literature of the subject. It is believed that the operation differs in some details from that described by Roe, although being on the same general plan.

The operation is performed as follows: The vibrissæ are cut from the vestibule and the skin cleansed. The interior of the nose is sprayed with adrenalin chloride solution 1-1000, followed by a spray or douche of a mildly antiseptic solution, such as boric acid. The patient is then anesthetized with ether, a mouth gag inserted and the posterior nares tamponed. The ether is then administered on loose gauze held over the patient's open mouth. Any adhesions or synchiæ between the septum and lateral structures of the nose are divided with a scalpel. One blade of a slightly modified Adams forceps (see cut), having the blades smoothly polished and the edges of the blades rounded, is placed well up inside the nostril to the articulation of the nasal bone with the septum; the other blade placed outside the nose, protecting the skin with several layers of gauze or with a pad of rubber. The blades are brought in gentle approximation and the forceps are then rotated outward. This procedure breaks the nasal bone from its attachments and lays it outward on the cheek. The forceps should reach almost to the naso-frontal articulation, and it is necessary to hold the inner blade firmly in the anterior superior angle of the cavity of the nose, as at times much force is required to make this fracture *complete,* and the instrument is apt to slip. The opposite bone is treated in the same manner. After completely fracturing the nasal bones from their attachments, any deformity of the perpendicular plate of the ethmoid taking part in the deformity is corrected by fracture with the same forceps by rotation, or with the Roe (*loc. cit.*) fenestrated forceps. If the Adams forceps are used, care should be taken to insert them only to a depth corresponding to the line of the external naso-frontal angle. This will largely tend to prevent fracturing the posterior parts of the perpendicular plate of the ethmoid bone. If the cartilaginous septum is involved it should be corrected at this time. After the septum is straightened each nasal bone, with the soft parts protected as before, is grasped with the forceps and turned toward the opposite side of the face. This procedure is important, especially in young patients, as it prevents incomplete fractures and renders the parts malleable. The

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forceps are again introduced, straddling the septum, and the whole bridge is elevated into position by raising the blades; with the blades of the forceps holding up the bridge the exterior of the nose is moulded by the fingers into the desired shape. If "humps" are present they should be depressed by further fracture with the forceps, or by the following procedure: a small bar of steel—the handle of a mastoid chisel suffices—previously guarded by drawing over it a piece of heavy rubber tubing, is placed against the "hump" and struck a blow with a mallet. At times this requires considerable force, and care should be taken not to strike in a direction that might drive a fragment into the surrounding soft parts or through the nasal mucous membrane. Where the nasal process of the superior maxilla takes part in the deformity, or where this process may be utilized to lengthen one of the crura of the arch of the bridge, it is split off as follows: a square-faced mastoid chisel, or preferably a chisel with a concave cutting edge (see cut), is placed within the nostril just beyond the vestibule against the protruding process. The chisel should be directed upward by holding the handle against the lips, while the cutting edge is held at the junction of the nasal process with the body of the maxilla. A few blows with a mallet will split off the process or a fragment of it, and the splitting may be repeated through the one incision until the desired amount of bone is completely loosened. These fragments are then moulded with the rest. This splitting-off of the nasal processes is particularly valuable in deflections of the whole nose, as it permits of a replacement from the very root of the nose. If the fracturing process has been complete, it is surprisingly easy to reform the bony parts of the nose into a desired shape. There is practically no muscle strain to undo the moulding, so that until cicatricial contraction takes place there is no need for the use of external appliances to act as splints. If the septum has been extensively involved, it is well to insert an intra-nasal splint, one that will support the weight of the soft parts of the nose. For this purpose the writer uses a splint of gutta percha shaped after the model of his "Cork Splints for Deflections of the Nasal Septum" (Manhattan Eye and Ear Hospital Report, 1894). They are fashioned to meet the varying conditions of individual cases, the general shape being depicted in the cut. The long, narrow anterior end is meant to be placed in the sulcus of the vestibule of the

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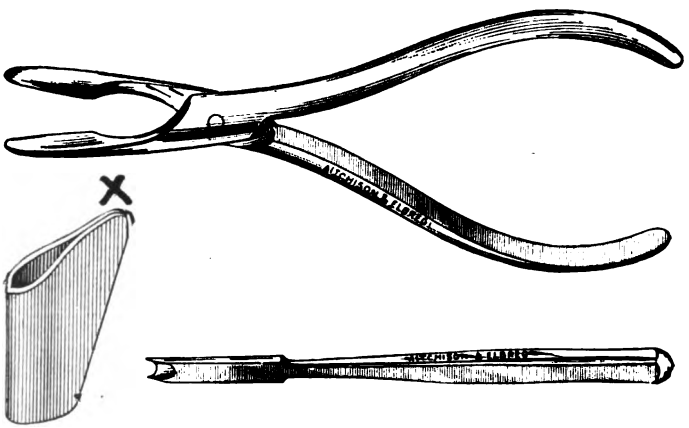
nose, which effectually prevents its slipping out of the nostril, at the same time supporting the tip of the nose.

If the septum has not been extensively involved, and if the fracturing has been sufficiently complete, the parts when moulded into position will remain without support, either internal or external, at least until cicatrical contraction begins, and this is not until the considerable swelling that always follows any fracture has subsided. The after-treatment for the first three to four days consists in the external application of iced cloths, together with a frequent spraying of the nares with adrenalin chloride solution of sufficient strength only to keep free the nasal drainage and respiration. As the swelling subsides the nose is ma-



X.—Anterior-superior end.

nipulated only sufficiently to keep the parts in proper position. If there is a tendency for any part to become depressed, it should be replaced and a small packing of gauze or spunk (*fungus chirurgor*) inserted beneath it inside the nostril. Cocaine locally applied renders this procedure painless. The manipulation of the bones themselves, when once broken, is lacking in pain until union has taken place. This packing need not be of sufficient bulk to interfere with respiration, and should be placed well up beneath the depressed fragment. If the fragments show a tendency to spread apart externally, and in the writer's experience this is the more frequent occurrence, especially where the nasal processes of the superior maxillæ have been involved, an external splint is applied. This splint is the ordinary so-called "Fox Eye-

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Glass Clip," with the shell sheathing made somewhat longer and broader than usual. By bending the spring it can be made to hold firmly, and by bending the flanges pressure can be applied at any particular point, and if necessary an extra strip of metal can be fastened to the flanges, as in "F" photograph. These clips may be worn constantly by the patient, even in bed, with but little discomfort. For street wear glasses may be attached. The patient should be kept under observation for from four to six weeks, and the splints, external or internal, when needed at all, should be carried fully this length of time at least, for safety as a protection against cicatrical contraction. If internal splinting is necessary one splint usually suffices. The splint mentioned may be cleansed *in situ* so readily that it need not be frequently removed.

There are various lesser deformities of the nasal bridge that can be corrected without resorting to the extensive operation detailed. For instance, a small "hump" caused by the outward displacement of the inferior end of a nasal bone can be reduced by a stroke or two of a mallet, protecting the skin with the rubber-armed chisel handle. When once fractured, the fragment will remain in place without further care. This deformity uncomplicated is rare, and is mentioned only as an instance of what may be accomplished by force when properly applied.

Although the operation is intended for corrections of external deformities of the bridge of the nose, these deformities are frequently complicated by deformities of the cartilaginous portions of the nose, perhaps the most frequent complication being a deflected cartilaginous septum. In fact, the cartilaginous septum practically always takes part in the deflections of the perpendicular plate of the ethmoid. When this complication exists it must be corrected, the writer preferring the fracture method of Adams (*British Medical Journal,* October 2, 1875) or Roe, as these methods do not remove tissues that may be useful in lengthening out the supporting column. This does not alter the after-treatment other than to compel the insertion of an intra-nasal splint, and possibly to necessitate the removal after healing is complete of a septal spur or shelf. If after the nose is healed there remains a depression at any point, and this not infrequently happens, especially just below or at the junction of the cartilaginous with the bony parts, the insertion of a few drops of paraffin with a

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syringe may be resorted to. Where this procedure is necessary preference is given to the method reported by Harmon Smith (*Journal American Medical Association*, September 19, 1903), whereby the paraffin is injected in a semi-solid mass to prevent possible carriage by a blood-vessel of a small mass of the paraffin in the form of an embolus or thrombus.

The correction of small convex deformities of the bridge, resulting from the "tilting" of a nasal bone, has been mentioned. When there is a slight degree of tilting forward and the septum is not involved, the crushing process suffices. Where the crushing process is inadvisable, owing to the extent of the convexity, the sub-cutaneous dissection after the method of Roe (*loc. cit.*) is resorted to. This is accomplished as follows: The patient is prepared for operation, etherized and tamponed as before described. A small quantity of 1-2000 sterile adrenalin solution is then injected hypodermically into the soft parts about the site to be operated on. This will materially lessen the bleeding. A small scalpel is then used to incise through the soft parts inside the nares just above the vestibule. This is facilitated by using a bivalve speculum to put the ala on the stretch. The scalpel should hug the bone from the junction of the nasal process of the superior maxilla with the body of that bone and extend upward to beyond the articulation of the septum and nasal bones. This procedure is followed on the opposite side, the two incisions meeting and extended by the use of a small periosteal elevator high up beyond the deformity. Care should be exercised not to perforate the skin, but the incisions should be made as free as possible. The small finger can be inserted a considerable distance between the bone and integument and be used as a guide for chisel, knife or saw to remove sufficient tissue to give the desired shape. If the nares are small, a bivalve speculum or a small periosteal elevator or other flat small instrument may be used as a retractor and to protect the integument from injury. Considerable judgment must be exercised as to the amount of tissue to be removed, and care must be taken not to perforate through the parts into the nasal fossæ. The clever manipulation of transplanting a "hump" from its attachment into another location to fill in a depression has been untried by the writer, preference having been given to the use of paraffin after healing had taken place from the operation for the removal of the "hump."

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The intra-nasal splint mentioned previously for supporting the septum is made to fit each case in the following manner: A piece of sheet gutta percha is cut into a rectangle 1½ in. long and twice as broad as the measured distance between the floor of the vestibule and the deepest part of the sulcus of the vestibule. This is dipped into hot water and bent on itself: a small steel instrument is used to preserve a lumen, while the edges are pressed together with the fingers. The splint is then trimmed with scissors or knife into the desired shape, and the edges

A B

smoothed and "annealed" by bringing them into contact with a hot metal, such as the lid of a steam sterilizer. The edge of the anterior end is flattened somewhat by pressure to avoid irritating the mucous mebrane of the sulcus. This splint puts the soft parts of the anterior parts of the nose on the stretch and supports them; at the same time, being quite broad and flat, it lies closely against the septum. Being locked between the floor of the nose,

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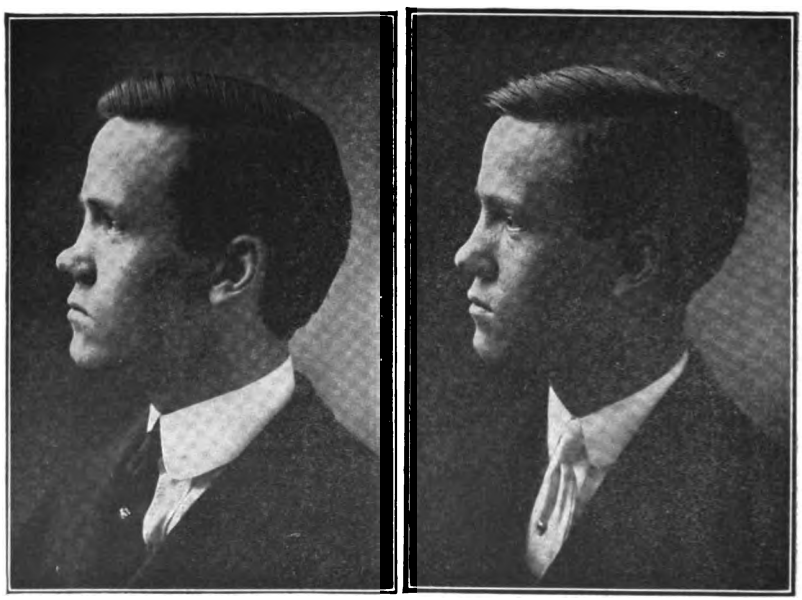
the inferior turbinate and the sulcus of the nose, it cannot slip out. It is easily cleansed, is not irritating, and is easily and quickly made.

Photographs "A" and "B" are of a patient 20 years of age, whose nose had been injured when he was about 8 years old. There was a sigmoid lateral deflection of the nasal bridge, caused by a dislocation of the right nasal bone and nasal process of the superior maxilla outward. The left nasal bone was at its anterior inferior border dislocated to the left, making a "hump," while



C D

the tip of the nose was deflected to the right. The whole anterior portion of the septum was deflected in a long bend to the left, and was adherent in its upper half to the lateral wall of the nose just above the vestibule. After dividing the adhesions, the chisel was used to free the right nasal process, while the remainder of the operation was completed with the forceps. The intranasal splint was carried three weeks, and the eye-glass splint was worn six weeks.

Photographs "C" and "D" illustrate a patient 22 years old, who had his nose injured in infancy. There evidently had been

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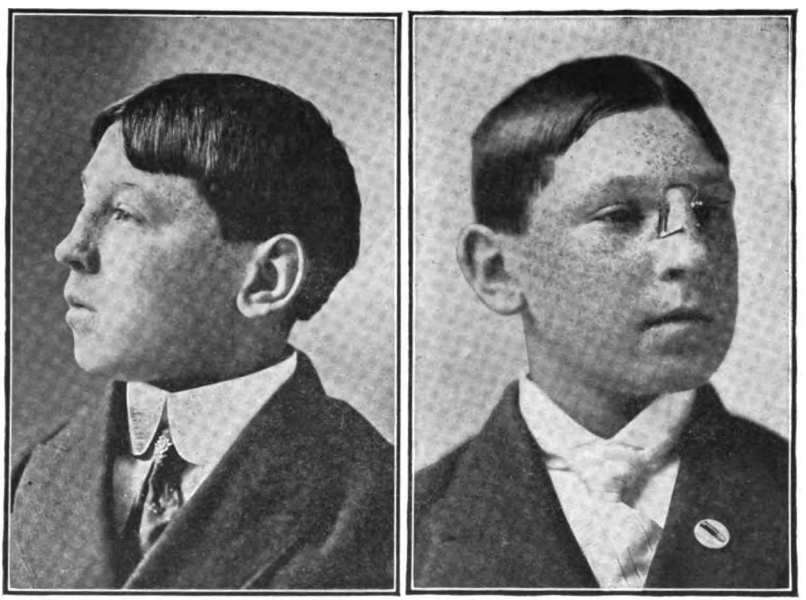
a simple depressed fracture of the nasal bones, involving the nasal processes of both maxillæ. The septum was bent to the right in a long bend, terminating near the floor of the nose in a small shelf. There evidently had been some absorption of tissue at the point of articulation of the cartilaginous with the bony bridge. The chisel and forceps were used in this case after the small shelf had been removed from the septum by sawing. An intranasal splint alone was used in the after-treatment. It was carried for five weeks. The result of the operation was perfect, excepting that a small depression in the bridge remained just below the



E F

nasal bones. This was filled in with paraffin four weeks after healing had taken place, *i.e.*, ten weeks after the operation.

Photographs "E" and "F" are of a patient 16 years old, with a vague history of possible injury in infancy. The bridge and tip of the nose were deflected to the left of the median line of the face. The right nasal process of the superior maxilla was dislocated to the right. The right nasal bone was lying at an obtuse angle with this process, while the left nasal bone was raised at its whole anterior border, and with the left nasal process made nearly a right angle with the general outline of the face.

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The appearance of the nose was as though force had been applied to the crest of the bridge, and this crest pushed to the left. The septum nearly occluded the left nostril by a long curved deflection, in which the perpendicular plate of the ethmoid took part. The chisel and forceps were used in this case; and it was extremely interesting to see the play of the septum beneath the skin during the fracture after the nasal bones had been fractured. As the forceps with the septum between the blades were rotated to one side or the other, the whole character of the deformity of the crest of the bridge would change. Extreme rotation to one side would be accompanied by a depression of the bridge and a deflection of the tip to the opposite side. This is mentioned to emphasize the importance of the septum as a part of the *support* of the bridge. The intra-nasal and the extra-nasal splints were worn in this case for six weeks. The deflection of the septum recurred on the opposite side to a slight degree. The external deformity was successfully corrected, excepting at a point just above the tip, where there was an old cicatrix. About one drop of paraffin injected at this point was sufficient to completely obliterate all traces of his old deformity.

A STUDY OF THE FATAL RESULTS OF OPERATIONS UPON THE NOSE AND THROAT.

BY FRANCIS R. PACKARD, M.D.

WHEN one considers the enormous number of operative procedures which are now performed in the nose, naso-pharynx and pharynx, which are in most instances classed as minor operations, being done under local anesthesia, and, as a rule, without necessitating the confinement of the patient to bed, it is really a matter of surprise that so few fatal results are recorded. That fatalities do result from them is but too well known. It was with an idea of ascertaining somewhat more definitely the facts concerning the mortality attendant upon such operations that the following paper was undertaken. It is, of course, impossible to obtain satisfactory statistics on such a subject, but a mere collection of the recorded cases, and a summary of the conclusions to be drawn from them, will, it is hoped, possess some value and interest for those engaged in rhinological work. In collecting my cases, I

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have not included cases in which the patient suffered from tuberculosis, or any other disease to which his death might be in any way attributable, nor have I included cases in which the operation was performed for the removal of a malignant growth. There are a number of instances in which operations for the removal of sarcomatous and carcinomatous tumors have resulted fatally within a short time after their removal, but in all these cases there is the possibility that the tumor was so far advanced that the patient's death was to be expected within a short time, and though it may have been hastened by the operation, it was not solely attributable to it.

It is astonishing that with the widespread use of cocain as a local anesthetic in the nose and throat, there are so very few fatal cases from its use. I have been able to find but one fatal case. It is reported by Baker.[1] The patient was a girl 12 years old. A considerable quantity of cocain solution, the exact strength and amount not stated, was sprayed into the post-nasal space for the purpose of removing adenoids. The operation was completed and the patient sent into another room. While putting on her wraps, she suddenly became faint and fell over dead.

I have tabulated all the cases I could gather from the literature, and in doing so have included those reported in the tables compiled by Dr. Holloway[2] and published in 1896, and Dr. F. W. Hinkle,[3] which were published in 1898. I have been unable to add very many to their totals. I thought it best to include their cases with mine in order to render the material on the subject convenient of access.

As will be seen by the table, the total number of deaths attributable to the use of a general anesthetic was 26, divided up as follows: Chloroform, 24; chloroform and A. C. E. mixture, 1; ether, 1. In two of these cases, at autopsy, the bronchi and lungs were found filled with blood. Their reporters, however, regarded the fatal results as due to the anesthetic, so that I have included them in the table. The case in which death followed the administration of ether was that of Dr. G. M. Marshall, of Philadelphia, communicated verbally to the Section on Otology and Laryngology of the College of Physicians of that city, the fatal result occurred some days after the operation, and

[1] American Journal of Ophthalmology, 1893, Vol. X, Page 342.
[2] Medical Magazine, London, 1896, Vol. V, page 598.
[3] New York Medical Journal, October 29, 1898.

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TABLE No. I

DEATHS ATTRIBUTABLE TO THE USE OF A GENERAL ANÆSTHETIC DURING OPERATIONS UPON THE NOSE AND THROAT

	REPORTER	REFERENCE	OPERATION	AGE	SEX	ANÆSTHETIC	REMARKS
1	Burton & Seeds	Brit. Med. Journ., Dec. 18, 1880, p. 997	Removal of tumor of nares	Adult..	M.	Chloroform	Cause of death, syncope.
2	Anonymous....	Lancet, 1890, vol. ii, p. 449.....	Removal of tumor of nares.....	.....	.....	Chloroform	Death from combined effects of anæsthetic and obstruction of air passages.
3	R. C. Smith...	Lancet, May 21, 1892.....	Removal of adenoids with Lowenberg's forceps.	11 years	M.	Chloroform	Death from failure of respiration.
4	.....	Brit. Med. Journ., Feb. 18, 1893.....	Removal of adenoids.....	10 years	F.	Chloroform	Autopsy, bronchi filled with blood.
5	Anonymous....	Report of Lancet Com. Lancet, April 1, 1893, vol. i, p. 774.	Removal of adenoids.....	.....	M.	Chloroform	Death from syncope.
6	T. W. Bailey..	Brit. Med. Journ., April. 22, 1893, vol. i, p. 860.	Removal of adenoids.....	3 years	.....	Chloroform	Respiration ceased before operation was begun.
7	H. Tilly.....	Brit. Med. Journ., Aug. 12, 1893, vol. ii, p. 384.	Removal of adenoids.....	11 years	M.	Chloroform	Chloroform given for two minutes.
8	J. Braithwaite.	Brit. Med. Journ. Aug. 26, 1893, vol. ii, p. 483.	Removal of nasal spur.....	21 years	F.	Chloroform	A little over fz. IV of chloroform was given.
9	.....	Yorkshire Mercury, Sept. 22, 1893....	Removal of adenoids.....	9 years	F.	Chloroform	....
10	Anonymous...	Lancet, Sept. 30, 1893, vol. ii, p. 817....	Removal of adenoids.....	9 years	F.	Chloroform	Death a few minutes after beginning anæsthetization.
11	S. W. Plummer & R. Robinson	Lancet, Oct. 7, 1893.....	Removal of adenoids.....	63 years	M.	Chloroform	Less than fz. I of chloroform used. Died of syncope after apparently coming out of anæsthenia.
12	.....	Brit. Med. Journ., Oct 14, 1893.....	Enlarged tonsils.....	10 years	.....	Chloroform	Chloroform given twice.
13	.....	Marylebone Mercury, Dec. 23, 1893...	Enlarged tonsils.....	12 years	.....	Chloroform	.....
14	.....	Brit. Med. Journ., March 29, 1894....	Removal of adenoids.....	7 years	F.	Chloroform	At autopsy, trachea and bronchi filled with blood.
15	F. White.....	Brit. Med. Journ.....	Removal of nasal polypus.....	40 years	F.	Chloroform	Death before operation, 3 or 4 minutes after chloroform had been begun.
16	Edmund Owen	Archives of Pediatrics, March, 1895 .	Removal of post nasal growth....	7 years	F.	Chloroform	.....
17	.....	Brit. Med. Journ.....	Removal of enlarged tonsils.....	4 years	M.	Chloroform	Death two minutes after administration of chloroform.
18	.....	Brit. Med. Journ.....	Removal of adenoids.....	10 years	M.	Chloroform	Death before operation was begun.
19	.....	Lancet, Jan. 4, 1896.....	Hypertrophied tonsils.....	20 years	F.	Chloroform	Death early in operation.
20	.....	Dr. Holloway's Table Med. Mag., June, 1896.	Removal of tonsils and adenoids..	Under 10 years	.....	Chloroform	Private information given to Dr. Holloway.
21	.....	Brit. Med. Journ.....	Hypertrophied tonsils.....	9 years	M.	Chloroform	Death before operation was begun.
22	.....	Brit. Med. Journ., July 10, 1897.....	Removal of adenoids.....	16 years	M.	Chloroform	....
23	McCardie....	Clinical Magazine, May 18, 1898.....	Removal of tonsils and adenoids..	5 years	F.	A. C. E. mix. & Chloroform	Started anæsthenia with A. C. E. mixture and then changed to chloroform.
24	Dr. Dunn of Chicago	Hinkel, N. Y. Med. Journ., Oct. 29, 1898	Adenoids.....	Child..	.....	Chloroform	Personal communication to Hinkle.
25	F. W. Hinkel..	N. Y. Medical Journ., Oct. 22, 1898.	Removal of adenoids.....	6 years	M.	Chloroform	.....
26	G. M. Marshall	....	Intranasal polypi.....	.....	M.	Either.....	.....

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was apparently the result of an ether bronchitis. The patient was a very decrepit old man. These statistics seem to furnish a most conclusive argument in favor of the use of ether in preference to chloroform in operations upon the nose and throat. Hinkel[4] refers to the fact that deaths from chloroform occur with peculiar frequency in patients who suffer from what the French term *"lymphatisme,"* a condition which is sometimes called the "habitus lymphaticus." It is in the victims of this diathesis that hypertrophy of the faucial tonsils and adenoids are of most frequent occurrence. I cannot do better than quote Hinkel's conclusions on the subject, with which I am in the fullest accord:

"1. Statistics show an exceptionally high mortality from chloroform anesthesia in the operation for the removal of lymphoid hypertrophies of the pharynx.

"2. The observations of the Vienna pathologists show that sufferers from 'adenoids' frequently belong to an abnormal constitutional type, that has been found peculiarly susceptible to chloroform narcosis.

"3. In view of the statistical and pathological data presented, the general use of chloroform in operations for hypertrophied tonsils, or nasopharyngeal adenoids, is inadmissible."

The youthfulness of the patients who died as a result of the administration of an anesthetic for these operations is, of course, to be explained by the fact that operations of this character are much more commonly performed on children than adults. Thirteen of the cases were in their first decade, and we might add to this number the case noted as a "child." Four were in the second decade, and 2 in the third. The other cases which were classified accordingly to age were: Adult 1, 40 years 1, and 63 years 1. One case is referred to as "an old man."

As regards the sex, of the cases in which it was mentioned, 10 were males, and 9 females, which may be regarded as a very negative showing indeed.

Of these cases I have collected and tabulated twenty-two. I must confess the result of my labors surprised me very greatly. So much is said and written about the danger of encountering a hemophiliac in the course of our operative work, and of the fatal result which may be expected if any cutting operation is attempted upon such a person, that I had been led to expect that

4 Loc. cit.

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TABLE No II

DEATHS RESULTING FROM OPERATIONS IN THE NOSE AND THROAT IN WHICH THE FATAL ISSUE WAS NOT THE RESULT OF THE ANÆSTHETIC.

	REFERENCE	OPERATION	ANÆSTHESIA	AGE	SEX	REMARKS
1	L. Galliard, Bull. Soc. of anat. de Paris, 1880, Lv. 438.	Application of perchloride of iron for epistaxis.	.....	Youth	M	Autopsy showed gangrenous inflammation of nasal mucous membrane due to perchloride of iron, also meningitis in the region of olfactory nerve.
2	H. Knapp, Archives of Otology, 1884, vol. xiii, p. 51.	Operation by external incision for removal of nasal polypi and orbital tumor.	.....	47 years	F	Died four days after operation from purulent lepto meningitis.
3	E. J. Quinlan, N. Y. Med. Rec., 1890, vol. xxxiii, p. 292.	Cauterization with galvano cautery of middle turbinate. Had had several intranasal operations with saw and cutting forceps some months before.	.....	18 years	F	Died seventy hours after operation of meningitis.
4	Delavan, Trans. Am. Laryng. Assoc., 1892, p. 8.	Adenoids. Loewenberg's forceps and finger nail.	Ether	2½ yrs.	M	Died of hæmorrhage which set in eight hours after operation.
5	J. E. Newcomb, Am. Journ. Med. Sci., Nov., 1893, p. 574.	Adenoids, forceps and Gottstein's curette.	Ether	3½ yrs.	M	Died sixteen hours after operation from hæmorrhage.
6	A. Barkan, Occidental Med. Times, 1894, vol. iii, p. 118.	Tonsils and adenoids, guillotine and Gottstein's curette.	No anæsthetics.	6 years	M	Died the same day after repeated hæmorrhages. Paquelin cautery applied over operated area.
7	Leplat Journ. Ophth., Otol. and Laryng., April, 1895.	Frontal sinus probing and injection of lachrymal canal.	.....	.....	.....	Death probably from meningitis.
8	Schmiegelow, Monatschr. f. Ohrenh., 1897, vol. xxi, p. 115.	Removal of adenoids. Gottstein's curette.	Not mentioned.	12 years	M	Death from hæmorrhage. Patient had scrofula.
9	J. A. Kenefick, Laryngoscope, 1898, vol. iv, p. 251.	Adenoids. Gottstein's curette and forceps.	Ether	4 years	M	Died from effects of continued bleeding seven days after operation.
10	W. Preble, Boston Med. and Surg. Journ., 1898, vol. cxxxviii, 467.	Removal of adenoids. Forceps and finger.	Ether	11 years	F	Died of hæmorrhage on seventh day after operation.
11	R. Levy, Ann. Otol., Rhinol. and Laryngol., 1898, vol. vii, p. 241.	Asch operation	Cocaine	30 years	M	Died fifteen days after operation. Autopsy showed thrombus of post cerebral artery and cerebral softening—endocarditis, pericarditis and general septicæmia. Thrombus due to syphilitic arteritis. Hypodermic abscess on leg which may have caused septicæmia.
12	R. Levy, Ann. Otol., Rhinol. and Laryngol., 1898, vol. vii, p. 241.	Removal of exostosis	Cocaine used antipyrin spray and iodoform gauze packing.	25 years	F	Reported from practice of Dr. W. W. Bulette. Death eleven days after operation from meningitis.
13	Stucky, Am. Pract. and News, 1899, vol. xxvii, p. 171.	Removal of tonsils and adenoids. Guillotine and Gottstein.	Chloroform.	15 years	M	Boy very weak and septic. Death nine hours after operation from general condition of exhaustion and sepsis.
14	R. Sachs, Journ. Lar., Rhinol. and Otology, Feb., 1900.	Adenoids. Gottstein curette.	Chloroform..	10 years	M	Distinct history of hæmophilia in family. Constant hæmorrhage until death four days after operation.

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TABLE No. II—Continued.

DEATHS RESULTING FROM OPERATIONS IN THE NOSE AND THROAT IN WHICH THE FATAL ISSUE WAS NOT THE RESULT OF THE ANÆSTHETIC.

	REFERENCE	OPERATION	ANÆSTHESIA	AGE	SEX	REMARKS
15	A. A. Bliss, N. Y. Med. Journ., Sept., 1900.	Straightened nasal septum and removed adenoids.	Not noted	17 years	M	Distinct history of hæmophilia in family, ascertained too late to be of service. Died on fourth day after operation.
16	Ingals and Ohls, Am. Year Book of Med. and Surgery, 1901.	Removal of tonsils and adenoids, snare and forceps.	Chloroform	17 years	F	Death from hæmorrhage.
17	F. J. Stewart, Lancet, Nov. 15, 1902.	Tonsils and adenoids	Ether	7 years	M	Died thirty-two hours after operation from hæmorrhage. Required tracheotomy because of exhaustion of blood in throat. No history of hæmophilia, but Dr. Stewart considers that that was the cause of the bleeding.
18	Damianos and Hermann, Wiener Klin. Wochenschr., 1902, No. 9.	Tonsillotomy. Fahnestock		23 years	M	Died on the sixteenth day as the result of hæmorrhage. At autopsy multiple abscesses were found which were attributed to subcutaneous gelatine injections.
19	W. E. Casselberry, Chicago Med. Rec., Jan., 1893.	Tonsillotomy		3 years		Personal communication by operator. Had previously removed one of the patient's tonsils with absolutely no evil symptoms. Died from hæmorrhage.
20	Ricordeau, Thesis, 1886, Ref. to y Harmon Smith, The Laryngoscope, Feb., 1904.	Tonsillotomy		24 - 25 years	M	Operated upon by Borea. Died from hæmorrhage.
21	Ricordeau, Thesis, 1886, Ref. to by Harmon Smith, The Laryngoscope, Feb., 1904.	Tonsillotomy		8½ yrs.	M	Operated upon by Borea. Died from hæmorrhage.
22	J. S. Gibb, personal communication, 1904.	Correction of septal deformity	Cocaine used		M	Died from meningitis.

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a careful search of the literature would reveal a large number of such cases. My table shows but fourteen deaths from hemorrhage following operation for the removal of adenoids or tonsils, or both. This is either a testimony to the rarity of dangerous hemorrhage following such operative precedures, or to the carefulness with which such operations are avoided by the wary operator. As we would expect, the deaths from hemorrhage following these operations are most common in the young. Of the fourteen cases of death from hemorrhage which are in my table, eleven were ten years old or younger. Following the usual natural history of hemophilia, deaths from hemorrhage occur much more frequently in males than in females. Of the fourteen cases there were eleven males died from hemorrhage following the removal of tonsils or adenoids, and two females. The sex of one patient was not stated. Of the remaining eight operations within the nose and throat in which the death of the patient could not be ascribed to the anesthetic, two resulted from meningitis following an attempt at correction of a septal deformity. One of these occurred in the practice of Dr. Joseph S. Gibb, of Philadelphia, and has never been published, although Dr. Gibb reported it verbally at a meeting of the Section on Otology and Laryngology of the College of Physicians of this city. Dr. Gibb has kindly written for me the following history of the case:

"A vigorous, healthy-looking young man presented himself at the clinic of the Episcopal Hospital with a well-marked deviation of the septum, which he was exceedingly anxious to have corrected. The operation was done under cocain anesthesia. The septum was corrected by introducing a saw beneath the most prominent part of the deviated portion, and sawing in an upward and inclined direction through to the other nasal chamber. The deviated portion of the septum was then pushed through this incision and retained in position by means of a Mayer tube. There was considerable shock following the operation, though no unusual hemorrhage occurred, and in consequence, and contrary to the usual custom, he was advised to remain in the hospital, which he did. The next day he left the hospital, the resident-physician reporting his condition good. According to instructions, the second day after the operation the patient called at the office of an assistant; the tube was removed and cleansed, and the nasal chambers were also well cleansed and the tube replaced. At this time

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TABLE III

DEATHS FOLLOWING OPERATIONS UPON THE NOSE OR THROAT IN WHICH THE EXACT CAUSE OF FATAL RESULT WAS NOT GIVEN

	REFERENCE	OPERATION	ANÆSTHESIA	AGE	SEX	REMARKS
1	Locherer, Friedreichs' Bl. f. Gericht. Med., 1882, vol. xxxiii, p. 23.	Curettement of nasal polypi				
2	R. Wagner, Munchr. Med. Wochschr., Dec., 1891.	Galvano cauterization of middle turbinates followed by hæmorrhage requiring tampon.				Death in three days.
3	V. Lauge, Deutsche Med. Wochschr., No. 29, 1892.	Galvano cauterization for bony and membranous occlusion of right nasal fosa.				Death six days after operation.
4	K. Stoerk, Centrall. f. Laryngol. und Rhinol., Sept., 1895, p. 826.	Curettement for chronic purulent rhinitis.				Death in three days.
5	Rayser, Annals of Ophthal. and Otol., Jan., 1896, p. 210.	Removal of polypi by snare, empyema of antrum of Highmore.				Death eleven days after operation.

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his condition was reported to me as good. He was not seen again either by myself or any member of my staff, not withstanding explicit directions were given him to report at the hospital, until the seventh day after the operation, at which time my assistant was called to see him at his home. He was then in a septic condition, showing some evidence of meningeal irritation. This condition grew rapidly worse. He had hyperpyrexia, maniacal delirium, coma, and finally death on the eighth day after the operation."

The remaining six cases of the twenty-two in which death resulted from an operation upon the nose and throat, and was not the result of an anesthetic, were as follows:

Application of perchloride of iron for epistaxis, causing death from meningitis.

Operation by external incision for removal of nasal polypi and orbital tumor. Death from purulent leptomeningitis.

Cauterization with galvano-cautery of middle turbinate. Death from meningitis.

Frontal sinus probing and injection of lachrymal canal. Death from meningitis.

Removal of exostosis. Death from meningitis.

One case of death from sepsis and exhaustion is reported following tonsillotomy in a boy. The tonsils were the seat of purulent deposit at the time of their removal. To summarize, it will thus been seen that in twenty-two cases of death following operation in the nose and throat in which the fatal issue was not the result of the anesthesia, in fourteen cases the cause of death was hemorrhage, in six meningitis, and in two general sepsis and exhaustion.

In this group I have collected five cases. In several of them I have been unable to ascertain the exact cause of death, because it has been impossible for me to get the original article, and the reference gave no further particulars than those which I have included in the table. They, every one of them, occurred as the result of intra-nasal operations. There was one death attributable to each of the following operative procedures:

Curettement of nasal polypi.

Galvano cauterization of middle turbinates followed by hemorrhage requiring tampon. Death in three days.

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Galvano cauterization for bony and membranous occlusion of right nasal fosa; death in six days after operation.

Curettement for chronic purulent rhinitis; death in three days.

Removal of polypi by snare. Empyema of antrum of Highmore; death eleven days after operation.

In each instance death occurred a number of days after the operation, and in every instance one is led to suppose by history that it was due to meningitis. From the above it is readily inferred that meningitis as a complication of intra-nasal operation should not be lightly regarded. It has occurred and proved fatal in enough instances to make us realize that the close relationship existing between intra-nasal structures and the meninges is not to be overlooked in our intra-nasal operative work.

Discussion.

Dr. CORNELIUS G. COAKLEY, in discussing this subject, referred to two cases. One of the patients was sent to him suffering from asthma. This patient had very large tonsils and also adenoids, and had periodical attacks of bleeding from the gums. The referring physician thought it might be possible, by removal of the adenoids, to restore nasal breathing. Dr. Coakley thought it would be unwise to operate upon this child, and therefore placed it on one grain of powdered suprarenal extract three times a day in chocolate, and in a very short time, something like two months, mouth breathing had entirely disappeared and, strange to say, the tonsils had markedly decreased in size. He did not dare put his finger into the nasopharynx to ascertain whether or not the adenoids had decreased at all in size, fearing he might thus set up hemorrhage. In a few months, however, the nasopharynx was only moderately occupied by adenoid tissue and the nasal respiration was much better. There was no bleeding, but it was Dr. Coakley's opinion that if he had operated upon this child there would have been a severe or fatal hemorrhage.

The second case referred to was one in which he considered death due to chloroform anesthesia. The patient was a woman referred to him for a most intense headache, and having polypi in both nares. She had chronic suppuration in both antra, ethmoidal cells, both frontal sinuses and sphenoids. After a number of the polypi had been removed, operation was advised. The headaches would sometimes begin at five o'clock in the morning and continue until about eleven at night, being most intense until she had discharged a good deal of pus through the nose, after which they subsided somewhat. As the patient had a great deal of bronchitis, Dr. Coakley employed one of the men in New York,

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who make a specialty of giving anesthetics, to administer the chloroform. She took this agent very badly, but the anesthetist refused to use ether. Both frontal sinuses were operated upon, and at the end of about an hour and a half the patient's condition was such that the anesthetist asked the operator to desist from further operation at that time, fearing the patient could not stand it. During a greater part of the operation, the patient was cyanosed, and her pulse was rapid. At the end of seven weeks the frontal sinuses were entirely healed, and she decided to have the antra operated upon. The antra were therefore opened under chloroform anesthesia. The patient was under the anesthetic for about an hour and three-quarters, and was partially cyanosed for a while. At the end of the operation she was removed to her room, and the anesthetist promised to stay with her until she recovered fully from the anesthetic. After washing up from the operation, Dr. Coakley went in to see how the patient was progressing; she was partially conscious, her pulse was about 140, her respiration could not be called either particularly good nor bad. He had not been gone from the room five minutes before her heart stopped beating, and all methods of resuscitation were undertaken by the anesthetist, but without effect. Dr. Coakley thought there is no question that chloroform was the cause of death in this case.

Dr. THOMAS HUBBARD reported a case in which the cause of death was uncertain. The patient was a child 10 years of age, having no constitutional disease, who about two years previous had a very severe influenza coryza with infection of accessory sinuses. There was evidently some suppuration, as the discharge was very profuse and recurrent. Since this attack there had been severe, almost daily, headaches. On examination there was found a very marked deviation and hypertrophy of the septum, and adenoids were also discovered. There was subacute otitis media. As soon as all acute symptoms had subsided, the septum operation, consisting simply in the removal of the exostosis, was performed, and the child recovered promptly. This operation was done in February. About two weeks later the adenoid operation was performed with apparently excellent effect. Dr. Hubbard left town early in April, convinced the child was on the high road to improved health, and only learned of the child's death the last of May. The attending physician gave the history that, about the middle of April, there was a return of the headaches, with very severe excruciating frontal pains. Leptomeningitis is thought to have resulted from the latent empyema, which existed for two years prior to operative procedure.

It is stated that in many cases having a headache, which is possibly due to suppurative or catarrhal condition of any of the sinuses, there is also found an abnormal condition demanding surgical intervention, either a hypertrophied condition of the sep-

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tum or hypertrophied turbinates or adenoids, or cystic enlargement of ethmoidal cells. Any surgical procedure in a case in which there is a latent accessory sinus, empyema or accumulation of pus in any part of the body, must reach and evacuate the pus cavity or the patient is left in a dangerous condition. Stress was laid upon the importance of approaching such cases with care, and where there is the possibility of a latent empyema the surgical intervention must be undertaken with extreme caution, and at the same time the operation must not stop short of thorough drainage of the existing seat of suppuration. Although Dr. Hubbard was not sure that the operations had any direct bearing on the fatal meningitis following six weeks after the last operation, it was only natural that the operator should feel more or less responsibility.

Dr. J. W. GLEITSMANN stated that he knew of several deaths from anesthesia which had been reported, but which Dr. Packard had failed to mention in his paper. Dr. Gleitsmann reported a case in which death occurred after an operation under ether. The patient died four or five days after operation, and Dr. Gleitsmann fears it was used in too great quantities. In this connection he mentioned the fact of his having read a paper on ethyl bromide narcosis at the general discussion of anesthesia in operations upon the nose and throat, at the meeting of this Association in 1901.

Dr. EMIL MAYER felt that hemophilia is often mistakenly stated as a cause of death after operation. As an illustrative instance, he reported a case with which he was fully familiar.

A young man, apparently in the best of health, except for a stricture of the urethra following gonorrhea, was operated upon by the usual cutting operation, and within a few days died of hemorrhage. The unexpected death of the patient not only produced profound shock to his family, but the attending surgeon was most severely blamed. A brother of the patient was in a profound state of melancholia, and was brought from his distant home to his office, as one of his most serious complaints was that of constant fulness in the throat. While no severe pathologic conditions existed, his pharynx had such a peculiar appearance that he was asked if he had ever had syphilis. He denied it. Under mild local treatment, and very active general treatment, he improved very rapidly, and the reports were so gratifying that the father of the patient came to call and express his delight. The father's appearance at once indicated that at one time in his life an active syphilitic disease had been in progress, as he had but a very small remnant of a nose.

In answer to queries as how he acquired such deformity, he said that he had been kicked by a horse when a child. When asked if any other member of his own family was similarly marked, he said that a sister had the same trouble. She was not kicked by a horse, he said, but she had "the scrofula." The

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point then was that the speaker was able to recognize syphilitic appearances in the young man's pharynx, that the father had hereditary syphilis, and that the young man who died had an arterio-sclerosis, which caused hemorrhage and death, and not hemophilia, as reported. A knowledge of these readily obtainable facts would have been a ready weapon of defense for the villified surgeon.

Where there is history of hemophilia we should proceed with great care, acknowledging its gravity and importance. In one instance, a child had been brought to the speaker with hypertrophied tonsils, the mother stating that all her family bled freely and extensively after the slightest injury, and she feared a cutting operation on her boy. The tonsils were removed by frequent applications of the galvano-cautery, and there was no loss of blood. Some time later, the mother of this child had hemorrhoids, and told the surgeon who wished to operate of the family tendency. He, nevertheless, operated, and at the time of operation there was no bleeding of any consequence, nor was there any for ten days. On that day, however, with the removal of the rectal tube, there was a most fearful and alarming hemorrhage, thoroughly exsanguinating the patient and causing the surgeon hours of anxiety.

Dr. JOHN H. LOWMAN spoke of the use of chloride of calcium for coagulation of the blood in operations upon hemophiliacs. He mentioned a case which was operated upon in Baltimore, and which resulted fatally. In this case jaundice was present. The coagulation time of the blood was not estimated until after the operation. On account of inexplicable hemorrhage, the coagulation time of the blood was estimated and found to be 10 minutes. Chloride of calcium will diminish the coagulation time many minutes. In typhoid fever with threatening hemorrhages, the use of chloride of calcium is a routine treatment in Lakeside Hospital. In one instance under his observation, the coagulation time was diminished from fourteen minutes to six minutes in three days. It is believed that chloride of calcium loses its power of increasing the coagulability of the blood after ten days.

Dr. CLEMENT F. THEISEN spoke of a solution which may be familiar, and which he has recently used in a tracheotomy. This is a solution which should be put up under aseptic precautions, and the bottle kept in 1-1000 solution of bichloride until it is to be put into a sterile syringe just prior to the operation. In a recent tracheotomy for severe suffocating stenosis of the larynx, in which the patient had a nearly fatal attack, this solution was employed, and the patient complained of no pain whatsoever. An advantage of this solution is that when employing it one can take his time. The use of general anesthesia in performing a tracheotomy is dangerous, the operation only being performed as an emergency operation to a greater or less degree. In the vast

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majority of cases a general anesthetic is rarely necessary. Dr Theisen also spoke of the advantages and disadvantages of the solution mentioned. The solution consists of equal parts of a ½ per cent. cocain solution, and a 1-10,000 solution of adrenalin chloride, making a ¼ per cent. cocain solution and a 1-20,000 adrenalin solution. It is only necessary to inject a few minims along the line of incision.

Dr. J. PAYSON CLARK reported a case of death after operation for papilloma of the larynx in a child, for which he was at a loss to account. His experience has led him since then never to remove a papilloma of the larynx without previous tracheotomy, and to use atropin in such cases in very minute doses. The case reported was that of a boy, three years of age, operated upon some ten years ago. There was no marked obstruction, but a certain amount of roughness of both voice and breathing. On the morning of the operation the patient was given 1/200 of a grain of atropin by the mouth, and was then transferred to another ward. The house officer in this ward repeated the dose, not knowing it had already been administered, so that the child had altogether 1/100 of a grain of atropin. Examination of the heart was negative. The child was held in the lap of a nurse, and removal of the growth was attempted by the use of Schroetter forceps. A number of small pieces were removed. The operation was rather difficult, there being great reflex action, and it was difficult to get the epiglottis out of the way. The child was carefully watched during the operation, and the pulse taken from time to time. After operating for half or three-quarters of an hour it was noticed that the child's color still remained good. Suddenly, however, the child was noticed not to be breathing so well, and in a moment or so he stopped breathing altogether. He was immediately held up by his feet, as it was thought there might be something in the larynx, but without effect. Tracheotomy was therefore immediately performed. Artificial respiration was tried and the child worked over for an hour, but all in vain. There was considerable frothy mucus discharged through the tracheotomy tube, which suggested the condition of edema of the lungs. There was no autopsy, and the question still remains as to the exact cause of death, whether there was an edema brought on by the fact that the child did not get sufficient air into the lungs through the partially obstructed larynx, or whether death was due to the atropin. In the latter case, the patient must have been unusually susceptible to the drug, for the dose, while a large one, should not be a dangerous one, even for a child of three, and it should also be borne in mind that it was given in divided doses at an interval of fully an hour.

Dr. J. W. FARLOW, in this connection, mentioned the fact that it was not a very agreeable or delightful task to report the death of a child after an operation which is usually successful, and he

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believed this accounted for the many cases operated upon but never recorded. He referred to two cases of this nature which recently came to his knowledge, and which had never been recorded in print. In one case, which was operated upon by a very competent laryngologist, the child died very soon after the removal of the tonsil under ether anesthesia. In the other case chloroform was the anesthetic employed, and the patient, a young man of about 17 years of age, died a few hours after operation. Dr. Farlow thought that a member of the American Laryngological Association having such a case would be likely to report the same, but that there were a great many laryngologists, mostly young men just starting out, who feared the report of such accidents would be detrimental to their practice. In one of the cases just mentioned, Dr. Farlow did not think the blame rested with the physician.

Dr. THOMAS J. HARRIS did not consider that the writer of the paper had properly presented the true number of deaths, since there are so many cases not recorded. His memory recalled a number of cases which have been recorded, but which he did not hear mentioned. He inquired if Dr. Packard had been able to ascertain whether or not the fatal cases had been under the observation of the surgeon for some time after the operation. He believed the author failed to mention the case reported by Dr. Knight, a case resulting fatally after an adenoid operation, occurring in the Manhattan Eye and Ear Hospital. This was a case of hemophilia, and was under constant observation following the operation. The only reason why this case was not kept in the spite of the most careful attention that both visiting and resident physicians could give. He believed that there were other such cases under observation, where it has been not lack of care on the part of the operator, but failure to recognize the hemophilia, which was the true cause of death.

Dr. JAMES E. NEWCOMB referred to his own case, in which there had been a fatal secondary hemorrhage following adenoid operation. The only reason why this case was not kept in the hospital was that it lived so near to it and so near Dr. Newcomb's house that the child was allowed to be carried home after the operation, with the understanding, however, that in case of necessity the parents were to summon the one of the hospital staff living nearest to them. Dr. Newcomb was not called to see the child until twelve hours after operation, at which time he found her moribund.

Dr. PACKARD stated that his paper was rather in justification of the operator than in criticism of him, and referred to the three cases of Dr. Gibb, Dr. Newcomb and Dr. Bliss, in which the operator was not called in or given an opportunity to check the hemorrhage. These patients went to their homes, and the operators were not summoned in time to be of use. It was his

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belief that in most instances the blame rested not with the operator, but with the caretakers of the patient. It was not his intention to convey the understanding that every case passed from observation, for some of them received most careful attention.

TWO CASES OF CHRONIC PEMPHIGUS OF THE MOUTH.

BY JOHN W. FARLOW, M.D.

UNDER the name of pemphigus were formerly grouped a variety of different diseases of the skin in which eruptions of bullæ were present. Further experience has shown that many of the cases should be excluded from this designation, and the name pemphigus is now applied (according to Morrow, *Dermatology,* Vol. 3, page 205) to "an eminently chronic disease of the skin, characterized by successive eruptions of variously sized bullæ, without any primary inflammation, running an indefinite, atypical course, and often ending fatally.

Grouven, in the *Archiv für Dermatol.,* Vol. 55, page 88, says: "Chronic pemphigus is a disease characterized by the repeated development of elevation of the epidermis of the skin or the epithelium of the mucous membranes. On the latter, bullæ are seldom seen, because the easily macerated covering bursts very early."

There are occasionally acute forms in which, also, the mucous membranes are frequently invaded, and dysphagia from lesions of the mouth and throat may be the cause of death.

It is a rare disease, occurring, perhaps, in the proportion of 1.5 per 1,000 skin diseases.

I will first give a short account of two cases which came under my care, and then discuss, in a more general way, the appearances which have been found in other recorded cases, together with the differential diagnosis and treatment.

Miss A., 22 years of age, was seen by me about ten years ago, and was under observation for several months. Her general health was good, and there was no family or personal history

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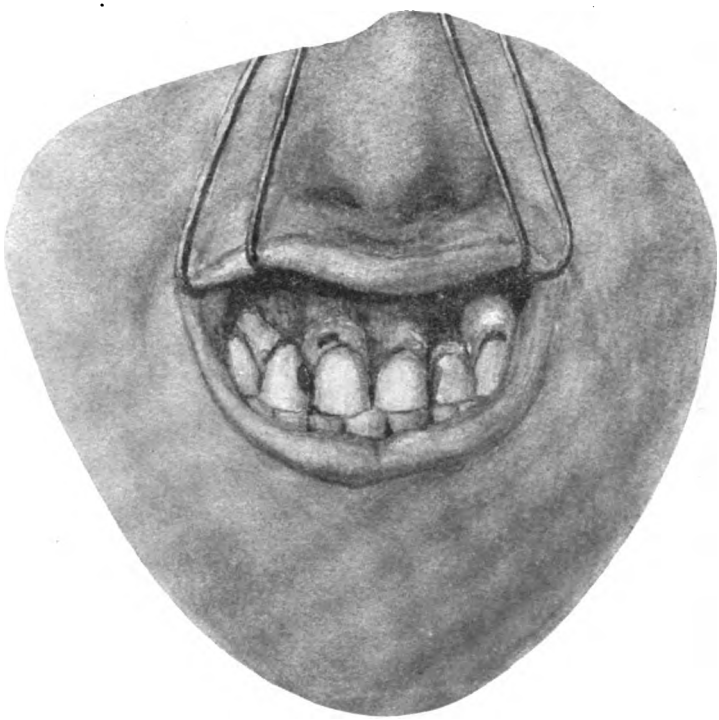
bearing on the case. For nearly a year before consulting me she had complained of blisters forming in the mouth, generally on the gums near the teeth. They appeared from time to time, were quite painful, and interfered with eating. I found the membrane at the seat of the eruption was whitish, loose and easily detached, leaving a tender, raw surface. Some of the spots were of the size of a cherry stone, and others were larger. They were confined to the gums near the front teeth and the inside of the cheek. There was nothing found abnormal elsewhere in the mouth or throat. Various sedative and astringent washes were



used, and in a short time the eruption would diminish, only to return again as before. This was the story during the entire time she was under my care. Examination of the teeth and gums by excellent dentists gave no clue to a cause; examinations of the urine for various mineral poisons were negative, and bacteriology threw no light on the case. I showed her at a meeting of the Boston Society for Medical Improvement, and also to a number of dentists, but no hint was forthcoming as to the nature of the case, and when I went away on my vacation the same crops of blisters were continuing to appear.

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When I returned from a three months' holiday I lost sight of my patient, and could not blame her for giving me up. I have not heard from her since, but I can show you a water-color drawing of the front of the mouth, in which the whitish, loose mucous membrane is well shown.

My second case served to throw light on case No. 1 and made clear to me the obstinate, chronic, recurring nature of the malady.

Mrs. B., about 55 years of age, was seen by me in July, 1897. For a good while, without known cause, blisters had appeared on the lips, gums, and inside of the cheeks. She said there was not much pain for about a year, but the blisters were getting much worse. The urine had been acid, and she had taken alkaline treatment. There was no trouble with the teeth. I found slightly raised, reddish swellings with raw surfaces on the gums near the upper left front teeth, very much as in my former case, although the color was not whitish. There was no trouble with the rest of the mouth or the throat. July 30th the gums seemed better, but there was tenderness of the membrane at the seat of the former eruption, which interfered with eating, and she preferred bland, liquid food. On September 12th she was much better generally, but the inside of the cheek and under the right side of the tongue were very sore. On October 17th an eruption of blisters appeared inside the right lower alveloar process. These were at first reddish, and soon lost their covering and became raw and tender. These crops of blisters had appeared from time to time, in spite of treatment directed toward the mouth and the general condition. The coverings of the blisters were redder than in the other case and did not show so much of the white, loose, detached membrane, but the two cases were otherwise very similar in appearance and behavior.

Later she went to Europe and was under the care of a number of eminent dermatologists and other specialists, but all to no purpose. A few days ago I received a letter from her Boston oculist, in which he says: "Mrs. B. has been under my care for the last five or six years. She went abroad three years ago and was treated by several specialists in Paris, and returned a good deal worse than when she went. A year ago last winter she went to California, where she had an attack of ulceration of the cornea. She returned to Boston last spring, having practically lost the sight of the right eye. She spent last winter in California, and I hear that her health is better. She has been taking increasing doses of arsenic, and when I last saw her the buccal mucous membrane was improved. It is strange to say that the ulceration of the mouth has not left the cicatrical bands that one would expect to find."

I have just received a note from an eminent New York dermatologist, who says: "Mrs. B. has been under my care, more or less, for about a year, with pemphigus of the buccal cavity and

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eyes. The blisters in the mouth have been controlled by the use of arsenic, etc., which, however, she has often had difficulty in taking. Before the treatment she would have as high as six or eight blisters during the day, but for several periods when under treatment she would often go a number of days without having one. The larynx has never been affected, so far as I know, and there have never been any cicatrices or adhesions from any of the buccal lesions."

A week ago, after I had written this paper, I saw Mrs. B. again. She told me that the blisters in her mouth had been almost entirely on the gums and the roof of the mouth, and occasionally there had been some far back on the palate, where she could barely reach them with the finger, and even beyond. There had been blisters in the nose, chiefly on the septum, with crust formation, pain, and obstruction to breathing. The nose had been free from trouble for a good while. At one time she suffered from similar eruptions in the vagina. She is entirely blind in one eye, and the other eye is giving her a great deal of anxiety. She now remembers that about twenty-five years ago she had an eruption on the lower leg and foot, the nature of which was not evident to the dermatologist whom she consulted. She has since been told that this may have been pemphigus of the skin. For about a year she has taken arsenic, one-half a grain a day, and thinks the blisters are, to a great extent, kept under control, as far as the mouth is concerned.

Such cases are very uncommon in New England, according to my experience. In looking over the records of the Boston City Hospital I found the case of a woman, 32 years old, with chronic pemphigus of the legs and body. There were also blebs and ulcerations of the inside of the mouth. After a stay of several weeks in the hospital she was discharged "Relieved." Dr. J. C. White, Professor of Dermatology in the Harvard Medical School, and in charge of the Clinic for Diseases of the Skin at the Massachusetts General Hospital for many years, writes me that he has seen but two cases of real bullous lesions of the mouth unaccompanied by disturbances of the integument before or afterward. In the few cases of real pemphigus of the skin which he has seen the mouth has been affected in a small percentage only.

Dr. L. H. Miller (*New York Medical Journal,* July 3, 1897) describes the case of a man, 72 years of age, who was under observation for twenty months. On the inner side of the cheek, opposite the second molars, on other parts of the mouth, and on

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the epiglottis were white patches, which could be stripped up like false membrane and bled on removal. This eruption appeared and disappeared from time to time, without regard to treatment.

Dr. J. H. Bryan, at our Twenty-first Annual Meeting, described a case where there was a white membrane on the epiglottis, and later on the gums just below the incisor teeth. Dr. Jonathan Wright, from examination of the laryngeal membrane, considered it pemphigus. He had previously seen and assisted in the diagnosis of Dr. Miller's case. Dr. Bryan thought it was to be differentiated from diphtheria, tuberculosis, syphilis, herpes, and the effect of acids and alkalies. Treatment was of but slight benefit.

In *The Journal of Laryngology,* March, 1894, is described a case shown for diagnosis by Mr. Creswell Baber. A man, 69 years of age, was seen in September, 1903. He had noticed roughness inside the cheeks for three or four months. Early in August he first noticed extensive white spots in the mouth and throat. Mr. Baber found numerous white patches of varying size and shape on the sides of the tongue, inside of the cheeks, on the gums, soft palate, and a similar condition in the larynx. These membranes were easily detached, and left a red, abraded, bleeding surface. The epiglottis was thickened and had white patches on it, and the cords were red and abraded. There was some dysphagia, but no dyspepsia. The case had apparently improved somewhat under treatment. Sir Felix Semon thought it a case of pemphigus. He said such cases were very rare, but in this instance the appearances were so characteristic that it was hardly possible to mistake it for anything else. The diagnostic difficulty was due to the short vitality of the bullæ, which lasted only a few hours. The only thing that could make one doubtful was the appearance of the inside of the mouth, but cicatrization was not uncommon in cases of pemphigus of mucous membranes. This was particularly characteristic when the disease affected the conjunctiva, causing the condition known as "essential shrinking of the conjunctiva." In these cases the patient might become totally blind. In the nose, adhesions and total obstruction might occur. The fact that there was no external manifestation was not in the least proof against the diagnosis. This was the fourth case he had seen. In the first two the affection was entirely limited

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to the mucous membrane. In the third case, which showed a condition internally exactly like Mr. Baber's patient, there was also pemphigus of the skin. The sequel to Mr. Baber's case is given in *The Journal of Laryngology*, August, 1904. In January bullæ appared on the skin, first on the abdomen and later on the whole integument except the face. The throat affection, which at the onset of the pemphigus on the skin seemed to improve, subsequently progressed *pari passu* with the latter. Arsenic was given in large doses, but appeared to do no good. He died of exhaustion in March. There was no eye affection.

Dr. J. C. Symonds also spoke of two cases which he had shown, one of which had the conjunctival form as well as patches on the pharynx and epiglottis. In the other case there were no bullæ, but curious white patches, which came and went.

An occasional result of the pemphigus eruption is the formation of adhesions between the mucous surfaces of the fauces. Avellis, in *Münch. Med. Wochenschr.*, No. 10, 1900, says that three cases of such adhesions have been reported, to which he adds a fourth, in which the soft palate and the posterior pillars were so united to the posterior pharynx that only a very small opening into the post-nasal space was left. By the use of hard rubber bougies the opening was dilated, the adhesions separated and prevented from returning. He states that such adhesions have to be differentiated from those of syphilis, scleroma, lupus, and diphtheria.

According to Dr. Brocq (*La Pratique Dermatologique*, Vol. III, p. 771), the study of the mucous membrane manifestations of pemphigus has assumed considerable importance in recent years, thanks to the numerous works of oculists and laryngologists. The known cases can be divided into two great classes: 1st. Eruption on mucous membrane and skin at the same time. There exist recorded cases in which the bullæ have remained confined to the mucous membrane for many years, and have finally involved the skin. These cases establish an insensible transition between the first and second groups. 2nd. Here the lesions are confined to the mucous membrane alone, and are found in the mouth, nose, pharynx, larynx, and conjunctiva.

Dr. A. Thost (*Monatschr. f. Ohrenheilk.*, 1896, Nos. 4 and 5) says: "Pemphigus of the mucous membrane of the mouth, pharynx, and larynx is a rare affection, which coincides nearly always

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with pemphigus of the conjunctiva and which attacks, ordinarily, cachectics or very old persons, and is never accompanied by pemphigus of the skin." (This last statement is quite contrary to the testimony of others.) "The affection is characterized by the appearance of irregular white patches, formed by an elevation of the epithelium, giving rise to bullæ of short duration, quickly replaced by whitish islets of detached epithelium. When there is contact between the parts affected there can form adhesions, as in the conjunctiva, the nose, pharynx, and the anterior commissure of the vocal cords. In the nose there may be epistaxis, sneezing, and crust formation. The characteristic features of chronic pemphigus of the mucous membrane are:

1. Affection exclusively of the mucous membrane.
2. Universal participation of the ocular conjunctiva, which tends to form synechiæ.
3. Tendency to proliferation and adhesion of mucous surfaces.
4. Chronic evolution without fever.
5. Treatment of no avail.
6. Cachexia and dystrophy, cutaneous and muscular.

Dr. G. Trautman, in his work, "Zur Differentialdiagnose von Dermatosen und Lues," Wiesbaden, 1903, cites four kinds of cases of pemphigus, with extensive bibliography:

"1. Skin eruption; that of mouth, etc., secondary.

"2. Co-existing skin and mouth, etc., eruptions.

"3. A large number of cases of primary eruption on mucous membrane, and secondary on the skin. In one case the skin eruption did not appear until eighteen years after the beginning of the buccal lesions. In another there was closure of the mouth for eighteen years from contraction of the mucous membrane of the cheeks. Kaposi, in over three hundred cases of pemphigus, had never seen contraction of the mucous membrane of the mouth.

"4. Many cases of mucous membrane eruption alone, one of twelve years' and one of twenty-seven years' duration.

"The places of predelection are the tongue, cheeks, lips, hard and soft palate, uvula, pharynx, epiglottis, and arytenoids, and it takes usually a descending course. Generally there are no intact bullæ seen, but grayish-white macerated membrane, loose, whitish deposit, flat red erosions, granulating surfaces, also circumscribed erosions with a covering of thin pus or a tenacious, thick membrane, which can become confluent and persistent; at

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times thickening of separate organs, as the epiglottis and vocal cords. Ulceration and deep loss of substance are occasionally seen. There are usually no enlarged lymph glands. It is very obstinate to treatment."

O. Chiari, in his book "Krankheiten des Rachens," says that "pemphigus pharyngis is nearly always in adults, and appears as on the skin. In the throat, as well as in the mouth, the benignant form seems to be very rare, as only a few authors mention its ending in recovery. But cases of many years' duration have been observed. The reason why the eruption in the mouth so seldom heals lies in the maceration by the saliva and mucus, and in the presence of numerous bacteria. On that account, in most cases, after a longer or shorter time, the mucous membrane of the mouth becomes to a large extent excoriated or ulcerated, so that chewing and swallowing are interfered with; consequently, pemphigus of the mouth generally assumes a malignant character. It begins in the mouth with either blisters or an epithelial thickening. Blisters, bullæ, appear if the exudation follows quickly and to a large amount. If the exudation takes place more slowly and in lesser quantity the epithelium becomes infiltrated and cloudy. If the exudation coagulates, a whitish or whitish-gray deposit forms, which has a strong resemblance to diphtheritic membrane. The bullæ become quickly macerated, so that they cover over the excoriated places like folded, rolled-up deposits. The mucous membrane in the neighborhood is often unchanged; sometimes thickened, here and there loosened and tending to bleed. In rare cases the first eruption can be accompanied by fever, but usually the patients are troubled only by salivation and difficulty in chewing and swallowing. After rupture of the blisters there remain circumscribed, excoriated places, which either become covered with epithelium or show a thin, purulent, or even a thick membraneous deposit. It is possible for the primary eruption to heal and the whole process be at an end. But nearly always a recurrence takes place after a longer or shorter interval. If these recurrences are infrequent and at long intervals, the process can still go on to a cure. But generally the latter recurrences follow quicker and quicker, so that the old eruption is not healed before the new one begins, and the mouth and throat are more or less completely deprived of epithelium, and the individual, by failure of nutrition, goes on to death from exhaustion. The process is

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generally fatal in less than a year, but can persist for three or more years. Complete recovery is very rare. Very exceptionally there are deeper ulcerations, or the formation of marked granulations on the excoriated places, or it may lead to a contraction of the entire mucous membrane of the mouth, as is observed in the conjunctiva. Not so very uncommon is an extension to the larynx, with formation of bullæ, excoriations, or edema, which may lead to dangerous stenosis."

According to Chiari, "the diagnosis is easy where there is pemphigus of the skin, and even when it is primary in the mouth the characteristic course of the disease is not difficult to differentiate; but it may be confused with diphtheria, stomatitis mercurialis, or epidemica, soor, tuberculosis, condylomata, herpes, erysipelas, and cauterizations.

"*Diphtheria* is generally in children, begins with fever, and does not last as long as pemphigus with its recurrences. The membrane is seldom in the mouth, but in the fauces.

"*Angina mercurialis* is seldom seen alone, and forms on the tonsils erosions, grayish-white deposits, or mostly superficial ulcers, and is generally accompanied by *stomatitis mercurialis.*

"*Angina ulcero-membranacea* is an unusual form of stomatitis, confined to the tonsils, and causes ulcers with dirty coverings. The above heal on removal of the cause.

"*Soor* is almost always in nursing children.

"*Tuberculosis* causes characteristic ulcers of the throat, and is generally associated with laryngeal and pulmonary disease.

"*Syphilitic papules* never form so extensive excoriations as pemphigus, and there are no bullæ.

"*Herpes* is characterized by small watery vesicles surrounded by a red areola, and the resulting ulcers are also small. They sometimes, however, become covered with membrane, which can become confluent over a larger surface.

"*Erysipelas* can, in rare instances, form large bullæ in the throat, but it is an acute disease, with a typical course.

"*Cauterizations with acids,* alkalies, hot water, steam, etc., can cause large blisters, but generally there are excoriations or deep, extensive necrosis of tissue, with various-colored sloughs. The history and course are unlike pemphigus."

In spite of the alleged ease of diagnosis, the fact remains that uncertainty and mistakes in regard to the nature of the affection

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have been very common when there was no external manifestation to furnish a clue. It is much easier to understand with what sort of a disease we have to deal when we have the patient under observation for a number of months or years and have tried the effect of syphilitic and other remedies, than it is to form a correct idea of the serious nature of the case when seen for the first time and there are only lesions in the front part of the mouth of uncertain character, and when the important fact of recurring lesions in spite of treatment is not yet developed.

Many cases have been considered as irregular forms of syphilis, but my two cases seemed to me more like examples of recurring herpes. But I now see that the detached pieces of white, loose epithelium, with the tender and bleeding underlying surface, especially when so rebellious to treatment and so prone to recur, gave a picture quite unlike herpes. Typical bullæ are much more likely to be found on the epiglottis than in the mouth.

When ulcerations and synechiæ appear on the conjunctiva they are a great aid to diagnosis. Several writers lay stress on the absence of enlarged lymphatic glands. In studying the cases there is noticed the usual absence of the eruption from the tonsils, an important point when considering the diagnosis from syphilis and tuberculosis. The adhesions between the mucous surfaces of the fauces and the pharynx require a very careful study into the past history of the case, in order to rule out very similar specific lesions.

The question naturally presents itself whether these cases of recurring bullous eruption of the mucous membrane without involvement of the external skin strictly belong under the title of true pemphigus. It seems to me that they do, because the eruption and course of the disease are the same whether the skin is affected at the same time or not, and also because the eruption may be confined to the mucous membrane for many years, to appear later on the skin. It is also perfectly possible for cases which have shown, up to the present time, no external manifestations, to develop bullæ on the skin at some near or more remote future time. The obstinate nature of the internal and external eruptions as regards treatment has a certain value in placing them in the same category.

As regards prognosis, Neumann, Mikulicz, and others consider that the primary or early appearance of pemphigus on the mucous

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membranes is a most important sign of a malignant form of the disease. Rosenberg, in his book on "Krankh, der Mundhöle," says the prognosis is unfavorable, as, in consequence of weakness (from difficulty in eating, etc.), a fatal termination comes generally in one or two years.

I do not see that the recent recorded cases of oculists and laryngologists prove the truth of this gloomy prediction. All agree that it is a serious and often fatal disease, but its duration seems certainly longer than one or two years in most cases. It is a serious matter to tell a patient of middle age, in fair health, that a few recurrences of blisters of the mouth point to very possible blindness, and a fatal termination inside of two years. I do not see that the facts surely justify such a statement. I have quoted Thost as saying that the disease ordinarily attacks cachectics or very old persons, in whom the disease would naturally run a malignant course, but I have found so many exceptions to this statement of the kind of person affected that I feel that his experience may have been different from many other writers'.

As regards treatment, a most important point is to keep the teeth, mouth, nose, and throat clean by proper alkaline and antiseptic washes, in order to prevent secondary infection of the erosions and other lesions. It may be necessary to use some local anesthetics in case the pain is sufficient to interfere with eating, and thus cause weakness. Cocaine, orthoform, and morphine are of value for this purpose. The lesions themselves can be painted with nitrate of silver of varying strengths, iodine preparations, etc., but my own experience did not furnish satisfactory results; for internal treatment arsenic has some strong advocates. Dr. Bulkley of New York is quite earnest in his recommendation of large doses. As to other drugs, there is a great difference of opinion, and no enthusiasm or encouragement that any of them have a surely beneficial action in retarding the progress of the disease. The general nutrition should be attended to very carefully, especially where there are painful lesions in the mouth or throat.

Dr. Miller's paper, referred to above, and Krieg's "Atlas der Kehlkopfkrankheiten" contain excellent colored plates of pemphigus of the mouth.

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Discussion.

Dr. J. H. BRYAN desired to state that in the case of his referred to by Dr. Farlow the credit of the diagnosis was not due to him, but to Dr. Jonathan Wright, and that it was the first case ever seen by Dr. Bryan. In this case the patient, who was past middle age, gave the history of never having had any eruption of the skin. A bulla was never seen in the case. The onset was accompanied by a pricking and burning sensation, with swelling along the gums. The eruption was principally confined to the gums and epiglottis, and along the aryepiglottis folds. So far as Dr. Bryan is aware, no cicatrices ever formed in this case. He kept in touch with the patient for at least two years, but since that time had almost lost sight of her, although he occasionally saw her on the street. On this occasion she informed him that she still had trouble with her mouth. On coming into his office one day, she stated that she had an eruption; but none of the false membrane had formed. The local treatment was of no avail, and the constitutional treatment helped practically not at all. Her general condition seems to be about as good as when she was under Dr. Bryan's care.

Dr. E. FLETCHER INGALS reported in this connection a case with adhesions and contraction of the naso-pharyngeal opening seen by him about eighteen months ago, in which there were no bullæ either upon the skin or within the mouth; there had been no diphtheria, syphilis, nor tuberculosis to cause the adhesions, and it was only by a process of exclusion that the attending physician and Dr. Ingals had finally reached the conclusion that it was a case of pemphigus.

Dr. Ingals also referred to the case of a young man, about 17 years of age, whom he had seen very recently, but in which he has not settled on a diagnosis. This patient had contracture of the opening into the naso-pharynx from the throat, and also from the nose, which came on gradually, without a history of any of the diseases usually responsible for such a lesion. Dr. Ingals was of the opinion that this also was a case of pemphigus. The patient has had several operations, but none had proved of any benefit.

Dr. D. BRYSON DELAVAN had seen many cases of pemphigus in the dermatological wards of the New York City Hospital, and said that pemphigus of the mouth was not uncommonly associated with pemphigus of the body. Under these circumstances diagnosis is easy. He thought there would not be reason for anyone who has listened to Dr. Farlow's paper to make a mistake in the diagnosis of this disease hereafter, whether or not the pemphigus of the mouth was associated with the external lesion. He believed that these cases were often treated for syphilis, this treatment resulting in more harm than good.

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Dr. EMIL MAYER suggested the question of differentiation between pemphigus and such membranous deposits as have been described as due to Vincent's bacillus, as in the case of Vincent's angina. Although the bacteriological examination shows the difference between the conditions, it is almost impossible to differentiate them from inspection only.

Dr. SAMUEL W. LANGMAID referred to a case in which the diagnosis was made by three European physicians. In this case, he had thought it would be necessary to do a tracheotomy, since there was such contracture at the top of the larynx. The conjunctival membrane was also constantly in trouble. This patient went to Europe, where he saw the gentlemen mentioned, who made the diagnosis of pemphigus, and each of them insisted upon the use of arsenic. Dr. Langmaid saw this patient in a friendly way, not treating him until after his return from Europe. At this time the patient was constantly under the influence of arsenic. Dr. Langmaid insisted upon the patient stopping this medicine, and his improvement under this changed method of treatment was very marked. He finally recovered from the pemphigus, dying from another disease. He was about 60 years of age when first seen by Dr. Langmaid, and he lived to be 72 or 73. Stress was laid upon the aggravation of the disease in this case by the use of arsenic.

With regard to differentiating between herpes and pemphigus, Dr. Langmaid stated that this had been troublesome to him. The whole history of herpes, however, differs from pemphigus.

Dr. THOMAS HUBBARD reported the case of a man who had typical symptoms of pemphigus of the fauces, but Dr. Hubbard treated him for some time before making the diagnosis. About six months later the patient's wife developed typical pemphigus of the skin, and was in desperate condition for more than a year. Both of these cases were seen by competent dermatologists, and there was no doubt about the diagnosis. The husband still has recurrent pemphigus of the fauces, although it seems of a mild chronic type. His wife, however, had the disease in a most aggravated form for about a year, and is now free from any symptoms.

Another case was referred to in which Dr. Hubbard made the primary diagnosis of pemphigus of the mouth in a woman who, about two months later, developed typical pemphigus of the skin, and who has since been under the care of a dermatologist. The disease in this case is most virulent and recurrent.

He reported another case which is still under observation, and in which the diagnosis is somewhat doubtful. The patient is a woman who has developed symptoms of pemphigus of the fauces. The attacks, which are recurrent, are not severe, and a dermatologist has pronounced it incipient pemphigus.

With regard to the use of orthoform in these cases for reliev-

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ing pain, as referred to by Dr. Farlow, Dr. Hubbard has found that orthoform and bismuth, with a small percentage of menthol, gave relief, and that the application remained upon the abraded surfaces, enabling the patient to take the proper amount of nourishment without distress.

Dr. JOHN H. LOWMAN thought that the case of husband and wife reported by Dr. Hubbard would suggest the diagnosis of *impetigo contagiosa.* This sometimes appears in the mouth and on the face, and comes in the form of large pustules. In a series of cases seen by Dr. Lowman, this disease first appeared on the face of a child, and from this child others contracted the disease. In another series the eruption appeared first in the mouth, and it was impossible in this series of cases to make a diagnosis until others had contracted the disease from the first patient, the eruption occurring on the faces or in the mouth. The diagnosis of *impetigo contagiosa* was therefore made. This question came up before the Pediatric Association a couple of weeks ago, and one observer referred to several instances in which the eruption had first appeared in the mouth. It is stated that when this eruption first appears in the mouth, then in the nares, and finally spreads over the face, and others contract the disease from the patient, the diagnosis of *impetigo contagiosa* should be considered.

Dr. FARLOW, in closing the discussion on this topic, stated with regard to Dr. Mayer's mention of Vincent's angiosis that this was an acute disease, while pemphigus was chronic, and also that it would be impossible for anyone to make a diagnosis of pemphigus of the mouth after seeing only one eruption. The fact that the eruptions are liable to be around the roof of the mouth serves rather to place the condition in a seemingly benignant class, while in reality it does not belong there at all. Dr. Farlow considered this condition more apt to be belittled than exaggerated.

With regard to Dr. Langmaid's surmise regarding herpes, Dr. Farlow agreed with him that there were certainly quite marked points of resemblance between the two conditions.

Regarding the contracture, it may be that, the mouth being so slightly open, it is difficult to see the cicatrices. The same thing occurs in the conjunctiva. In Dr. Farlow's case the oculist found very small cicatrices on the conjunctiva, but was unable to say what they were. Supposing the same thing occurred in the mouth, the gradual formation of these small cicatrices might indicate that it was pemphigus.

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FOUR UNUSUAL TUMORS IN THE NASO-PHARYNX.

BY WALTER F. CHAPPELL, M.D.

THE chief interest in these cases is the unusually large size of the tumors. In one case the tumor was also of considerable pathological interest, as so far no similar one has been reported in the literature of our specialty.

CASE I.—W. C., age 15 years, consulted me (September, 1902) for difficulty in breathing; worse at night. Four years previously she had taken a severe nasal cold, and since then was unable to breathe through the *R* nostril. This stoppage gradually increased, and during the past six months she has snored badly, and slept very little, owing to choking attacks.

Her weight decreased until it fell to seventy pounds. In general appearance she was pale, careworn, and imperfectly developed; the menstrual period had not yet appeared.

Case 1.

Examination of the *L* nostril showed it to be partially occlouded posteriorly. In the *R* nostril a whitish growth protruded anteriorly to within an inch of the anterior naris. On examination of the naso-pharynx, a large, reddish mass was found extending below the free margin of the soft palate and completely filling the naso-pharynx. This was removed with an adenoid curette, which was pressed into the mass and then slowly pushed downwards and backwards, tearing the mass from its attachment to the posterior end of the inferior turbinated body. Slight hem-

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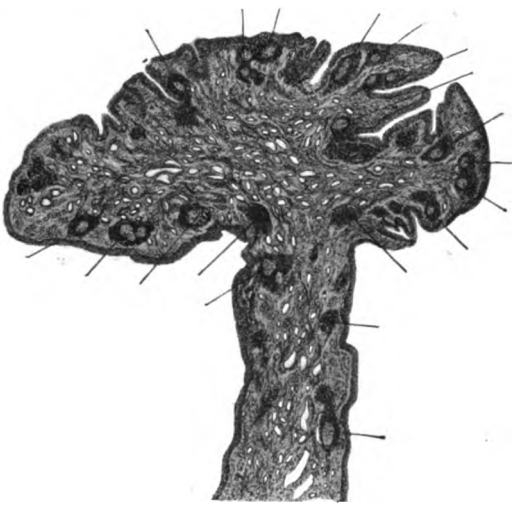
orrhage followed. On examination, the mass presented a reddish-white appearance, covered by a tough, fibrous membrane. It was 2 inches in length, 1½ inches in width, and ⅞ inch in thickness.

The nasal respiration was immediately restored, and sleep was better the first night than it had been in three years. The gain in weight the first week after the operation was 3 pounds and 4½ pounds more during the next three weeks, making 7½ pounds in a month. Two months after the removal of the growth the menstrual period appeared and a general improvement in health took place, which soon brought the patient to the average girls of her own age.



Case 2.

DR. JONATHAN WRIGHT'S REPORT.

Microscopic examination shows it to be largely made up of loose edematous connective tissue covered by columnar epithelium, undergoing some metaplasia, and somewhat desquamated. There are very few vestiges of the acini racemose glands. There are a number of thin-walled capillaries, and here and there very thick-walled arterioles. Diagnosis: Edematous polypus.

CASE II.—C. M., male, age 15 years, consulted me March 30, 1903, for a full feeling in the back part of his throat, nasal stoppage, and choking sensation at night. The first symptom was a nasal stoppage, and began about nine months previously, and had gradually increased to the present time.

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On examination, a large, gray, granular-looking mass was seen to extend 1½ inches below the soft palate, chiefly on the *L* side. The patient complained of no pain, the hearing was not impaired, and his general condition was good. His sleep had been so much disturbed recently that he felt much exhausted. The mass was removed through the mouth with a pair of forceps, and was found to be attached by a pedicle not over one-eighth of an inch wide and one-sixteenth of an inch thick; in fact, it seemed surprising that such a large growth could be held by such a small pedicle.

It was first supposed that this tumor had its origin from the inferior turbinated body, but a more careful examination, the following day, showed that it sprang from the superior vault of the naso-pharynx, between the inferior turbinated body and the eustachian prominence.

On inspection, the growth was found to be a pinkish-gray color, and the tissue on the surface arranged in small layers, like shingles on a house, or the scales of a fish. On palpation, it felt soft and elastic, very much like a sweetbread. There was very little hemorrhage after removal, and all the symptoms were immediately and permanently relieved. On inquiry, no reason could be assigned for the appearance of this growth, as the boy had always been healthy and had very few colds. I have recently seen the patient, and there has been no return, his health was greatly improved, and he has gained a great deal in weight.

DR. JONATHAN WRIGHT'S REPORT.

On measurement, this specimen is seen to have the dimensions 40 x 30 x 10 mm., and is by far the largest growth of its kind I have ever seen; nor have I ever before seen such a growth, as the microscope proves this to be, with a pedicle. Essentially it is nothing more than an enormous exaggeration of the so-called mulberry hypertrophies, very frequently seen, in a less advanced stage, at the posterior ends of the inferior turbinated bodies. The formation of the pedicle was evidently due to the size of the local hyperplasia, which, becoming movable, was gradually transformed into a pedunculated growth, in a manner sometimes illustrated by the occurrence of the so-called supernumerary tonsil of the fauces.

The pedicle is here made up, as is the bulk of the growth, of fibrous hyperplasia, in which are imbedded a very large number of the dilated venous sinuses of the erectile mucosa of the part. The most remarkable, and to me entirely unique, feature of this growth in this situation is the occurrence of lymph nodes.

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As is the rule in many local hyperplasias elsewhere, when excessive (best illustrated in elephantiasis of the scrotum and lower extremities), we have here of course a very limited degree of lymphangiectasis in several places beneath the epithelium of the surface, which has progressed to such an extent that the areas of engorgement with round cells are plainly seen by the naked eye, and under the feeblest magnification are seen to be identical to all appearances with the lymph nodes of faucial and pharyngeal tonsils.

The walls of these dilated lymph spaces are seen to consist in the sections of two or three strands of connective tissue, themselves channeled by ordinary lymph spaces, containing one or two rows of mononuclear leucocytes. The larger lymph vessel of the "node," having in each case the diameter of perhaps one-half of a millimeter, is gorged with leucocytes. The recticulum of the lymph node, owing to defective preparation for this purpose, while evidently present, is not easily identified in these sections. As in many scores of the hyperplasias from this region which I have examined, this is the only one in which I have seen lymphangiectasis of this character. I conjecture its occurrence here is due to the enormous size of the growth and the formation of the pedicle, which must have caused defective nutrition, or possibly congestion of the lymph channels, due to their compression in the pedicles.

The characteristics of the growth do not differ from those usually seen in hypertrophies of this vascular region.

SUPPLEMENTARY REPORT.

On further investigation, this tumor was found to spring from the *L* tonsillar region by a small pedicle near the eustachian tube. As to the foregoing clinical note, the microscopic evidence conclusively shows that most of the tissue which forms the tumor is derived from the erectile region of the inferior turbinated body. This is especially so of the pedicle, which contains many cavernous venous sinuses.

I cannot believe that the lymphoid tissue is derived from the lymphoid tissue of the pharynx. It is, I believe, the result of lymphangiectasis. We may imagine that it had its origin at the posterior border of the inferior turbinated body, where it lies in

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close juxtaposition to the rich lymphatic supply of the lymphoid tissue of the pharynx, and that this proximity to large lymph channels may have had its influence in the production of lymphangiectasis in the turbinated hypertrophy; but the growth is essentially a hyperplasia of the cavernous tissue of the nasal mucosa.

CASE III.—This case, shown in Cut III, was under the care of Dr. L. Emmet Holt, for whom I removed the growth, and I am indebted to him for the drawing. The growth was apparent below the free border of the soft palate, and caused the greatest amount of difficult respiration I have ever seen in a case of adenoids.

Case 3.

CASE IV.—This case, as shown in Cut IV, is an unusually large pharyngeal tonsil in a child 2 years of age. The faucial tonsils were also very large, and resembled the pharyngeal tonsil so closely in general appearance and size that it was difficult to distinguish between them.

The pharyngeal tonsil was plainly visible as a round, ball-like mass below the soft palate. The child was pale and emaciated and had an anxious appearance. It gained ten pounds in weight in the three months subsequent to the operation.

The great increase in weight after the operation in two of these cases shows the marked influence such an obstruction to respiration may have on the general nutrition.

Discussion.

Dr. EMIL MAYER said that, in this connection, he would like to briefly record an unusual post-nasal growth he had seen in a man 32 years of age. The objective symptoms were very slight; a glistening tumor showed in the pharynx attached to a small pedicle; it was readily removed with a cold wire snare, and examination showed it to be a pure mucous polyp, such as is found

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so frequently in the nose. The speaker found this an unusual site, and was at a loss to explain its occurrence there.

Dr. JAMES E. NEWCOMB reported the case of an Italian woman, living in good circumstances, who was referred to him some months ago with the history that she had not been able to breathe through the nose for five years. After a hasty examination of the throat, he felt sure she had a naso-pharyngeal fibroma. The soft palate seemed to be drawn closely to the pharyngeal wall, and Dr. Newcomb imagined the usual adhesion had taken place. He passed his finger under the soft palate, which produced consider-

Case 4.

able bleeding. He then sent the patient to the hospital and made all arrangements to remove a naso-pharyngeal fibroma. After the patient was placed under the anesthetic, he broke up several small bands of connective tissue, and a careful exploration of the naso-pharynx showed that there was no tumor at all. On one side there was a slight infiltration, and he suspected a syphilitic process was at work. The history, however, gave nothing confirming this suspicion. This was the first case of the kind which had ever come to his notice.

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THE COMPENSATORY ACTION OF CERTAIN OF THE LARYNGEAL MUSCLES SEEN IN CASES OF VOCAL DISABILITY DURING THE PAST YEAR.

BY CLARENCE C. RICE, M.D.

THERE are a few general considerations relating to this subject of compensatory action of the laryngeal muscles which may be of interest to state, before your attention is called to special instances. I have chosen to write briefly on this subject, because I have recently seen several examples of what may be called, perhaps not compensatory, but certainly irregular, disordered, or over-muscular action of the laryngeal muscles.

This subject, so far as we have observed it, is almost entirely of interest to singers, because the disorder usually has not been extreme enough to affect the speaking voice, and non-professional people are not in the habit of consulting specialists for a slight hoarseness. The laryngologist could be of the greatest service to the singer, actor and public speaker, and to the vocal teacher as well, if he could have the opportunity to observe from time to time, even if the singing voice was normal, particularly in the early years of vocal instruction, exactly how the muscular mechanism of the larynx was behaving. Just as the eye requires to be examined to see if errors in refraction exist and to determine the need of correcting lenses, so the muscular apparatus of the larynx should be studied to see if muscular action is normally performed. There is greater necessity of such examination of the larynx than of the eye, because abnormal muscular action may have commenced in the throat long before the voice shows any impairment.

Singing, in a large sense, is accomplished by almost an artificial or extraordinary use of the laryngeal muscles, and if they are forced to a degree of fatigue, a condition most easily brought about in the young, untrained subject, then it will be easily observed with a mirror that first the weakest of the laryngeal muscles, which is apt to be the internal or thyro-arytenoid, commences to lag in its work, and very soon others become more or less inefficient.

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The ambitious pupil perseveres in her effort to produce satisfactory tones, and soon, quite unconsciously, is using the large lateral adductors and the transverse arytenoideus, not only to get the bands together, but also to straighten them and to regulate tension, work which should be done by the finer adjusters, the thyro-arytenoid, and the thyro-cricoid.

It is not altogether the fault of the vocal instructor that the muscles in the young larynx frequently become abnormal in action, because parent and pupils demand quick results for the time and money devoted to study.

If a pupil of seventeen was told that five years should be spent in simply strengthening the vocal muscles, in nicely developing each particular one so that it could perform its function alone without assistance from any other group, she might be deterred from an attempt to cultivate the voice.

A larynx made strong, white and fibrous by years of singing, with wide bands, athletic arytenoids, evenly balanced all around muscularly—that is, with muscles all of which have just their proper power, no one too strong or too weak, with perfect muscular co-ordination—is a rare organ, and that is why there are so few attain to any great measure of success.

Of the thousand ambitious ones who commence, only a very few attain to any great measure of success.

Again, not only are the laryngeal muscles of the beginner weak because of lack of training, but there is another condition present in the young larynx which teacher and pupil should be made familiar with, that they may realize the importance of making slow progress during the first years of study.

There is present in the amateur larynx a padding of soft submucous tissue, which fills out the sides of the larynx so that scarcely more than a line in width of vocal band can be seen with a mirror. This is present also in the inter-arytenoid space, and at the base of the laryngeal surface of the epiglottis.

In the professional larynx all this tissue has disappeared from the sides, and powerful vocal bands of great width may be seen. The inter-arytenoid space is also clear of all interposing tissue which would interfere with the approximation of the bands.

The firm, white, hard larynx of the professional is the result of years of muscular training. The soft padding of sub-mucous tissue in the immature larynx can be dissipated or absorbed only by

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muscular motion, gentle at first, but gradually increasing in force.

If action is overdone at this stage, not only are the muscles too weak to stand the pace, but the soft tissue at the sides, front and back of the amateur larynx prevents easy approximation and tension of the vocal bands, which is in itself a large cause of vocal fatigue.

The laryngologist should determine by inspection from month to month the progress of muscular development of the larynx, and whether the amount of work is judicious.

When a soprano, twenty years of age, with vocal bands no wider than a line, is endeavoring to execute arduous rôles, which can only be safely done by a well-matured vocal organ, the result will surely be disastrous. The weaker muscles become fatigued, and the stronger ones immediately endeavor to do compensatory, that is, extraordinary, work; proper muscular balance is lost, and the voice is ruined from the standpoint of any great success.

This matter of irregular muscular action in the larynx is in no way surprising, for compensatory action throughout the entire muscular system of the body is not the exception, but the rule.

We should not forget that compensatory effort is Nature's attempt to remedy defective action.

It is proper now to speak of special examples of disordered muscular action which have been noticed in the larynx. Perhaps the most frequent example of muscular action "gone wrong" is that of the overdevelopment of the false chords or ventricular bands, producing an appearance, during phonation, which has been called the "choked voice." In these cases the sides of the larynx above the true bands, instead of being hollowed out to furnish vibratory chambers, are effaced by the jutting inwards of the false chords, which almost meet during attempts to sing, and nearly conceal from sight the true bands. This is a faulty muscular action, which it is almost impossible to remedy, because the false chords, which should be inactive, ligamentous tissue, become active muscles, and when once they have been given this power, how can it be taken from them?

The trouble here is due to a long-continued exhaustion of the tensors and straighteners of the true bands. As the difficulty to produce tone increases, stronger muscular efforts are made, not only by the lateral adductors, but also by the outside muscles of the neck, until by this over-exertion the sides of the thyroid carti-

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lage are forced inwards, and the false bands, which are, as has been said, ligamentous structures, become muscular in quality and behavior. This may be Nature's effort to furnish vibratory tissue as a substitute for disabled bands. Undue haste in forcing the young voice is usually the root of the difficulty, although faulty method of vocalization may be the trouble. If the cause is appreciated, the remedy is apparent.

Another example of irregular muscular action has recently been noticed in a long-standing case of "singer's nodules." These thickened nodes have appeared and disappeared at intervals during the past ten years. A soprano of more than ordinary reputation, doing exceedingly well at times, but distressed by long periods of partial loss of voice, has persisted in singing. This year the larynx was examined, and it was noticed that the transverse arytenoid and the other adductors had become so powerful in action that they had at length, in order to overcome the opposition of the vocal nodes, drawn one arytenoid cartilage in front of and in line with its fellow.

I think it is fair to offer this explanation, because the larynx has been examined many times, and this distorted relation of the arytenoids to each other, has never been present until lately. Perhaps a reasonable explanation of the cause of vocal nodules is that they are produced by the unusual friction of one band against the other, occasioned by too forcible adduction and tension of the chords.

We should say, rather, by an adduction and tension, which is made uneven by weakness of one muscle and over-strength of another.

Again, the strength of the transverse arytenoideus can, in a measure be determined by studying the size of the arytenoid cartilages. This short muscle is usually stronger, becomes less easily fatigued, can endure more hard usage than the internal thyro-arytenoid, so that failure to approximate posteriorly is less common than the inability to straighten the anterior three-fourths of the bands.

We have noticed recently, however, in two cases of singers of moderate reputation that the arytenoids were under-developed, were quite fragile in appearance, and it was further observed that the bands were brought together in front more strongly than at their posterior ends. This lack of traction behind allows the

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bands to sag together in front, and here is another condition favoring undue friction of one band against the other, and of the formation of those callosities which are called "vocal nodes."

In the last cases the under-development of the arytenoid cartilages and the arytenoideus muscle may be due to congenital causes, or to a method of using the voice which does not properly exercise the short transverse muscles. Electrical applications to the posterior part of the larynx helped in these cases.

We have all seen frequent instances of an unusual downward and backward movement of the larynx when the vowel "a" was sounded, when the larynx should have been brought upwards. In these cases it is difficult to study the muscular action of the larynx, because it is so thoroughly closed when the vowel is sounded. This is also an irregular muscular mechanism, and in what sense it is compensatory it is difficult to say. We have seen a number of these cases, and we think all were treated for vocal weakness due to inefficiency of the internal thyro-arytenoid and the thyro-cricoid muscles. We are inclined to believe that the downward pull of the larynx was an attempt at compensation made necessary by inefficiency of the thyro-cricoid. Fatigue of this muscle is not easily determined by the image in the mirror, although theoretically we know how the picture of the loose relaxed vocal bands should look. This downward motion of the bands seems to be due to a reversed action of the thyro-cricoid, by which the thyroid is pulled downwards, instead of the cricoid being drawn upwards. This irregular muscular action probably commences for compensatory reasons, and finally assumes the extreme form because of over-compensation. Possibly such reversed action has its cause in some unusual nerve lesion.

There are other varieties of disordered muscular action occasionally seen in patients who consult the specialist for impairment of the voice which I shall hope to speak of at a later date.

The thoughts in this short paper which may be worthy of consideration are:

1. That there exists throughout the entire muscular system of the body the intention and the habit of one group to render assistance to any other group of muscles which may be temporarily or permanently inefficient.

2. That compensatory service is more readily appreciated in

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the larynx than elsewhere, because its technique may be observed with the laryngeal mirror.

3. That the weaker of the laryngeal muscles are very easily fatigued by too rapid or by over-training, and that it is the habit of the stronger muscles to immediately offer their assistance.

And last, that although this compensatory action is wonderful from a physiological point of view, it is, unfortunately, accomplished at the expense of any great success in singing.

Discussion.

Dr. G. HUDSON-MAKUEN considered the great difficulty in making a diagnosis of faulty laryngeal action lay in the fact that the laryngoscope does not permit one to actually see the action of these muscles during the singing process. Although it was possible to see the action of the muscles during the single sounds, such as "a" or "ah," yet it was impossible to watch their action during the singing of different consecutive notes. He did not believe than many laryngologists made a practice of examining the larynx as carefully as Dr. Rice. They were not accustomed to examining the parts so closely, and they did not often have the opportunity of doing so in professional singers especially, because the professional singers and teachers have rather given up the idea of getting much help from the average doctor, or even from the specialist. Dr. Makuen considered it very important that this subject should be carried on in the way Dr. Rice suggested, until the musical singing profession was aroused to the fact that laryngologists do know something about it, and do have some theories and plans which might appeal to them. He inferred from Dr. Rice's statement regarding the drawing down of the larynx in certain cases that this was done by the extrinsic muscles of the larynx rather than the intrinsic. He considered the development of these extrinsic muscles of great importance to the singer, as well as to the teacher. Some time ago Dr. Makuen wrote a short paper on "The Training of the Extrinsic Muscles of the Larynx." The training of these muscles is a difficult task, for the reason pointed out by the author that patients and pupils cannot be educated to the fact that it takes a long time to master thoroughly the training of the voice. The training of the singer should begin, not by singing, but by voluntary muscular exercises irrespective of singing, after the manner of a person training for football or for rowing; that is, by first mastering exercises proper for the development of the muscles. The first essential step to the training of a singer was the training of the extrinsic laryngeal muscles; they should be trained so that they may work uniformly. They should be developed uniformly, so that one might get the

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voluntary action of these muscles without any tone whatever. If control could be gotten over the extrinsic muscles of the larynx, their uniform training could be easily performed, developing the weak ones and adjusting the action of all of them. The great difficulty was to get pupils and patients to take the necessary time for this sort of work.

Dr. RICE, in closing the discussion, urged that the matter of laryngeal troubles should not be forgotten in the great interest taken in nasal and pharyngeal work. He spoke of the name of the Association as being the American *Laryngological* Association, and therefore hoped that the interest formerly taken in diseases of the larynx would again be manifest. He agreed with Dr. Makuen that it is unfortunate that laryngologists cannot easily study the natural mechanism of singing with the mirror, because relations of parts are so altered by the presence of the mirror and by the forcing of the tongue forward. He looked forward, however, to the time when more successful work may be done. In his paper, he referred to some of the results of disordered muscular action which have usually been caused by years of abnormal behavior. Since there was a time when one could observe the commencement of a faulty action of the muscular larynx, the author believed that the laryngologist has a function and duty in carefully watching the muscular mechanism of the larynx to see if it is doing normal work. If he finds abnormal muscular action, he alone can instruct both the vocal teacher and pupil. The teacher is aware that the voice is wrong, but is unable to tell why it is so, and the laryngologist is the proper person to enlighten the teacher as to the proper way of correcting bad methods of vocalization.

DISCUSSION ON NEUROSES OF THE UPPER AIR TRACT, EXCLUSIVE OF THOSE DUE TO DIPHTHERIA AND ORGANIC DISEASE.—REFLEX NEUROSES OF NASAL ORIGIN.

BY G. HUDSON-MAKUEN, M.D.

THE relation of intranasal disease to certain pathologic conditions of the nervous system has been the subject of careful study and much speculation on the part of the rhinologist for many years, and even a cursory review of the literature would occupy more time than I have at my disposal. That it has long been a subject of interest even outside the realm of any single specialty is shown by the scholarly investigations of our own John N. Mac-

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kenzie, who gives ample proofs of the fact that the fathers in medicine, centuries before the advent of the modern rhinologist, plainly recognized the interdependence of certain nasal and nervous diseases. Neuroses of nasal origin have been divided into two general classes, the sensory and the reflex neuroses. The former class consists chiefly of disturbances of olfaction, anosmia, hyperosmia and parosmia, and of disturbances of sensation, anesthesia, hyperesthesia and paresthesia.

Anosmia, or absolute loss of smell, frequently occurs, and it may be due to a variety of causes. Zwaardamaker distinguishes three kinds: the respiratory, the gustatory and the essential. In the respiratory form, odoriferous particles are prevented from coming in contact with the mucous membrane of the nose by obstructions in the anterior nares, while in the gustatory form the choanæ are impervious to these particles. Essential anosmia is that form in which the epithelium is affected, or the nerve trunks and bulbs are either diseased or altogether absent.

According to Kundrat, congenital anosmia is not very rare. He reports a case of Heshels, in which there was an entire absence of the olfactory nerve and, in fact, of all the nerves of the nose. The larynx and genital organs were poorly developed, and the testicles were as small as beans. These are interesting observations, as showing the developmental relation between the nose, larynx and genitalia.

Cases of senile anosmia are of occasional occurrence, and we have also toxic anosmia following the infectious diseases. Influenza and acute coryzas are frequent causes. The introduction of chloroform, ether, cocaine, nasal douches, and even water, may affect temporarily the sense of smell. Graves reports a case of permanent anosmia by drawing off a foul pond. This was probably the result of over-excitation of the olfactory nerve. The nostrils in some cases seem to become inured to an odor in somewhat the same manner as the auditory nerve grows accustomed to violent excitation. Several cases of traumatic anosmia have also been reported, resulting from gunshot wounds and falls upon the occiput, in which there were fractures of the ethmoid and other bones of the cranium.

Basic tumors of the brain, meningitis and tabes have been mentioned as causes of anosmia, and rheumatism may affect the olfactory nerve. A case of left-sided loss of smell with aphasia has

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also been reported. Hysteria, in my experience, is frequently associated with recurring attacks of anosmia and agousia. Absence of smell for certain special things is not an unusual occurrence.

Hyperosmia, or a genuine hyperesthesia of the sense of smell, may be a forerunner of anosmia. It is often due to an excessive irritation of the olfactory nerve. Certain toxic substances, such as strychnia and the insufflation of morphia, according to Frohlich, may cause this disturbance of smell. It occurs with certain odors only, and it is increased in hysteria and neurasthenia. One patient could not bear the smell of meadows, and another could not read a fresh newspaper because the printer's ink caused him disagreeable olfactory sensations.

Parosmia, or parasthesia of the sense of smell, is of frequent occurrence, and the odor is almost always of a disagreeable character. It may be due to constitutional conditions, such as give rise to digestive disturbances, or it may be the result of local conditions, such as carious teeth, ozena, or suppuration in the nasal and accessory cavities. Zarnico reports a case in point of a woman who for years had been regarded as a hypochondriac because she complained of an unpleasant odor with no apparent cause, until finally an empyema of the antrum was discovered, the opening of which disclosed large quantities of offensive pus, and the proper treatment of which entirely removed the disagreeable odor. This would seem to emphasize the importance of a careful rhinologic investigation in all cases presenting these symptoms.

Parosmia is occasionally found associated with chronic nasal catarrh, especially of the hpyertrophic form, and influenza is also a frequent cause. Onodi reports two cases of physicians having influenza of a severe type and complaining of such odors as pitch, shellac, sulphur and cadavers. Intermittent parosmia is sometimes found in the aged. Parosmia occurs occasionally in tabes, and it is said to be an aura of epilepsy. Curious reflex disorders have accompanied anomalies of olfaction.

Kussmaul, in his celebrated book "Disorders of Speech," reports a case of a man, 65 years of age, whose whole life had been devoted to severe intellectual work and who, one day, jumped up from his desk exclaiming: "I smell sulphur! I have had a stroke!" and thereupon collapsed, and from that time on had verbal amnesia. Sander reports cases of epilepsy in which an awful odor preceded and continued throughout the attack, and in

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which gumatous nodes and nodules were subsequently found in the brain and olfactory nerves.

Féré, Binswanger, Gowers and others mention cases of epilepsy, preceded by olfactory sensations, in which no anatomical lesions could be discovered.

Anesthesia, hyperesthesia and paresthesia of the respiratory regions of the nostrils may also exist. This is well illustrated in making local applications to the mucous membrane, and in making examinations with the probe. One patient will endure the most drastic measures, while another will flinch at the slightest interference, Sneezing, cough and asthmatic breathing are the usual reflex symptoms of hyperesthesia of the mucous membrane. An example of a paresthetic condition of the nasal mucous membrane is a sensation of fulness or occlusion, which occasionally occurs when the nostrils are perfectly free. Hysteria is usually a concomitant of this condition.

In reference to the second division of my subject, namely, reflex nasal neuroses, I confess that I have always been more or less sceptical, and I have felt that the rhinologist, like his neighbors the ophthalmologist and gynecologist, has found in many instances what he most desired to find, and he has allowed his enthusiasm to carry him rather too far along these interesting lines. However, I have been entirely willing to indulge my colleagues in their speculations, and I have occasionally taken a hand myself, because I do not see that any special harm can come from them, and to be quite frank, I believe much good has come from them. The operative measures suggested for the relief of nasal reflex neuroses have been, as a rule, of such a character that if they do not cure the disease they will, at least, add to the comfort and happiness of the patient in other ways, and render him less liable to future respiratory troubles of various sorts.

I am of the opinion that the nervous symptoms which occasionally follow operations in the nasal cavities are the result of a faulty technique, such as a lack of the necessary antiseptic precautions, and not a result of the operation itself. In speaking of operations, however, what shall we say of the remarkable report of Alexander Francis of 402 cases of asthma, 346 of which had no nasal disease at all; and of these, only eight were not benefited by cauterization of the nasal septum (a doubtful expedient, it seems to me, under any circumstances). He claimed better re-

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sults from his nasal treatment of those having no intranasal disease than of those having intranasal disease. Of course, there may have been in the mucous membrane of the septum a condition such as B. Lewis reports to have found in the mucous membrane of the lower turbinal of a patient having severe nervous symptoms, namely, a nerve having a proliferation of fibres, and situated very near the surface. In one case there were 110 fibres and in another 50, and all the symptoms promptly ceased with the excision of these areas.

Another excuse for the cauterization of apparently healthy nasal mucous membrane has been advanced by P. McBride, who says that, if the irritation caused by operative interference within the nasal cavities can be held responsible for reflex disturbances in remote organs, may not a similar irritation be regarded as curative by its revulsive action, and may we not, therefore, use the electric cautery upon the mucous membrane in the same manner as we use a counter-irritant upon the skin?

My only untoward nervous symptom in a somewhat large practice of intranasal surgery occurred recently in a case of epilepsy, and I desire to report it in this connection because of its direct bearing upon the general subject. In March of the present year, during one of my clinic hours at St. Mary's Hospital, a well-dressed young man was brought to the accident ward by the police patrol, with the history of having had a fit on board a trolley car, and the resident immediately brought him to my clinic for nasal examination. I found an irregularly-shaped septum, with marked pressure in the region of the posterior third of the middle turbinal on the left side, and a marked obstructive spur in the anterior portion of the right nostril. In addition, of course, there was present a decided nasal and post-nasal catarrh.

I advised local treatment, to be followed by operative measures for the correction of the septal irregularities, in the hope of ultimately relieving or curing the epilepsy. The attacks had occurred only about once a year. It was decided to take my advice in the matter, and accordingly, the treatment was soon after begun. In due course of time I removed a large exostosis of the septum which was pressing firmly against the left middle turbinal. As the patient lived at some distance from any emergency aid, I decided to put in a thin piece of the prepared aseptic sponge devised by Dr. W. R. Simpson, to prevent the possibility of an

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annoying hemorrhage. He returned on the second day following the operation and reported having had two slight epileptiform attacks. Upon examining the field of operation, I found from the swelling of the sponge and surrounding tissue a considerable more pressure than I had anticipated, and I at once removed the packing. There have been no subsequent attacks. I must say that I was rather pleased than otherwise at the fact of the excitation of the attacks, because it seemed to indicate that intranasal pressure might have been a causal factor in the disease, and that we might, at least, hope for a cure by a removal of this pressure.

We are all familiar with the so-called "reflex arc." It consists, in its simplest form, of an afferent sensory nerve, an efferent motor nerve and a ganglionic, or cerebrospinal centre controlled to some extent by the higher cortical centres of the brain. The afferent nerve carries the impulse to the central station, from which it may be reflected to any part of the body having efferent connection. The reflex may be regarded as physiologic when the entire circuit, including its cerebral connection, is in good repair, and it is pathologic when the circuit or any part of it is not in good repair. Moreover, the impulse may begin in the terminal filaments of the afferent nerve, constituting what is known as a peripheral impulse, or it may begin in the cerebral cortex, and thus become a central impulse. A draught of cold air on the back of the neck followed by sneezing is an example of the former, and the act of blushing attendant upon a confusion of ideas serves as an illustration of an impulse of central origin.

From the foregoing it appears that a pathologic reflex always presupposes one of two things: either a disturbance in some portion of the reflex arc or some unusual peripheral irritation. A disturbance in the reflex arc renders the nervous system, as we say, "unstable," a condition which the neurologist calls hysteria or neurasthenia.

While it is quite possible, as I have intimated above, that a peripheral irritation within the nostrils or elsewhere may be the origin of a pathologic reflex, we must keep in mind the fact that, sooner or later, we have to deal with an unstable nervous system.

The reflex neuroses that are of undoubted nasal origin, and that seem to rest upon a firm theoretic basis, are sneezing, cough, spasm of the glottis and asthma, and the nerves through which the impulses pass in these neuroses are the anterior ethmoidal

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and the posterior nasal branch of the second division, and a branch of the dental nerve of the third division of the trigeminus. Sneezing, as it ordinarily occurs, is probably a physiologic reflex, and serves as a means of expelling extraneous irritating particles from the nostrils, and probably also as a warning in case of sudden exposure to draughts of air. It may, however, become pathologic when any portion of the arc through which the impulse passes becomes overwrought or hypersensitive. This reflex may be produced in many instances from any portion of the nasal mucous membrane, but there are generally points of special susceptibility, which points in my experience are by no means uniformly fixed as to location. Moreover, the sneezing reflex may be extranasal in its origin, as for instance, that which comes from a ray of bright light suddenly striking the eye, in which case the impulse is transmitted from the ciliary through the nasal to the ethmoidal nerve, and pressure upon superficial portions of the latter will often prevent the sneezing. Irritation of certain portions of the scalp will also sometimes produce paroxysms of sneezing.

The two most important and distressing symptoms of intranasal irritation are, in my experience, cough and asthma, and I mention them together because they are closely allied both anatomically and etiologically. François Frank has shown experimentally that nasal irritation will produce spasm of the glottis and bronchi, but, as Friedrich has aptly suggested, in order to be quite sure of our diagnosis we must have absolute clinical proof that the symptoms can only come from the nasal mucous membrane, that they can be completely arrested by anesthesia of the parts, and that they can only be finally cured by direct treatment of the offending area. We all of us, doubtless, have had cases of cough and asthma that have given these three clinical proofs of diagnosis. I have one under observation at the present time, and another which offers some difficulties of diagnosis because it is complicated with albuminuria. I am still in doubt whether the asthma is a reflex of the nasal or the renal disease, or whether both the asthma and renal disease may not be reflex symptoms of the nasal irritation. That the latter is a possible solution of the case is suggested by the fact that the nasal disease preceded both the other conditions, and its amelioration by local

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treatment is promptly followed by fewer attacks and less albuminaria.

Closely related to nasal cough and asthma we must mention spasm of the glottis. That this affection may be of nasal origin has been shown experimentally, and proofs of the fact are not wanting in clinical practice. An adult patient of my own, for example, will invariably produce an inspiratory crowing sound upon the application of a probe to certain portions of the nasal mucous membrane. The impulse in these cases is probably transmitted directly through the sphenopalatin nerves to the medulla, and thence reflected backward through the vagus to the respiratory muscles. This, probably, also explains certain phonatory disturbances that often occur reflexly in connection with nasal diseases. Farquer Matheson claims that stammering in early life is due in most cases to growths and diseases of the nasal cavities, and he reports several cases in which the removal of adenoids completely cured the stammering. After referring to the neurotic temperament of stammerers, he concludes that one of the following conditions is a constant factor, namely, hypertrophied turbinals, adenoids and chronic rhinitis. I am almost prepared to endorse these statements, for a careful study of upwards of 1,000 cases of all forms of defects of speech has led me to conclude that the neurotic temperament is a constant factor, and that 98 per cent. of all cases have some form of intranasal disease. Notwithstanding these facts, it must be admitted that we have few positive indications that defects of speech are due to intranasal disease. Matheson reports several cases cured by the removal of adenoids, and I myself have reported a case in which a severe form of stammering never recurred after the removal of one of these growths, but I confess I could not be sure that the operation cured the stammering. Indeed, I am of the opinion that it did not and could not, for the disorder was of several years' duration, and even if the adenoid growth had been the original cause of the stammering some years previously, the stammering had now become a nerve habit, and the removal of the growth, although necessary to a cure, should scarcely be regarded as sufficient. What I have said, of course, does not preclude the possibility, and even the probability, that intranasal disease is a cause of stammering and other forms of defective speech. Indeed, I incline strongly to this view, but to be quite sure of

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our ground in reference to the etiology of this affection, as is the case also to some extent with cough, asthma, chorea or any other neurosis, we must get hold of our case before the disease has become a nerve habit, or before certain complications arise which tend to perpetuate it even after the original cause has been removed.

In my case a vigorous campaign against the stammering habit was being carried on before and after the operation, and this was probably a greater factor in the cure than was the operation itself. My own opinion, however, is that the adenoid was probably one of the causes of the stammering, and that its removal was a necessary factor in the successful treatment of the case. Of all the stammerers that I have seen, I can recall but one or two that were brought to me at the very inception of the trouble. The old belief so common among the laity, and even among certain physicians themselves, that children "grow out" of these nervous affections is responsible for much neglect and unnecessary suffering.

That hay-fever is a neurosis, and that it has its origin in the nasal cavities, at least in some cases, have come to be fairly well-established facts, but that the morbid condition within the nostrils is only one of a series of causal factors in the disease is also well understood. The neurotic habit, the psychic expectancy and a certain irritating material in the atmosphere must be reckoned among the causal factors.

Orbital neuralgias are common in connection with nasal and accessory sinus disease, but the close proximity of these organs may account for the pain in acute cases. Aural disturbances are also frequently reflected from the nasal cavities. I had a somewhat painful proof of this fact some years ago in my own person. A unilateral intranasal pressure caused, among other things, distressing sensations in the ear of the affected side, and they were occasionally attended by slight vertigo, all of which symptoms were promptly and permanently corrected by the removal of a septal spur. Several similar cases occurring in my own practice have convinced me that vertigo should be classed among the possible nasal neuroses.

Although cases of epilepsy and chorea have been reported as cured by nasal surgery, I am not prepared to class them among the nasal neuroses. That the choreic twitchings of the muscles

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of the face and eyes in neurotic children are reflex conditions arising from nasal irritation I have many times proven to my own satisfaction.

The reflex influence of nasal irritation is often manifested in disturbances of respiratory rhythm. This is well illustrated in examinations of the mucous membrane with a probe, and in making topical applications. We ask our patients to breathe rhythmically, but they find it quite impossible to do so. François Frank has produced asphixia in animals by cauterization of the nasal mucous membrane. Retardation of the pulse, cardiac arythmia, and even syncope may result from reflex nasal irritation. Every rhinologist has observed these symptoms attendant upon minor operations within the nose. We sometimes attribute it to cocaine poisoning, or to psychic influences, but I am inclined to think that it is generally a reflex manifestation of the operation itself. W. H. Good and W. G. B. Harland have recently reported cases of apnoea and cardiac inhibition in operations upon the respiratory tract.

Vasomotor disturbances, both in the nose itself and in distant organs, follow irritation of the sensory nerves of the nose. Vasomotor coryza, hydrorrhea, and possibly also hay-fever, may be explained on this theory.

It is not always possible to draw the line between certain reflex nasal neuroses and those due to imperfect oxidation of the blood through faulty respiration. As Jacoby has pointed out, nasal occlusion, whether partial or complete, may result in an accumulation of carbon dioxide in the brain, and especially in the respiratory centres of the medulla, and thus produce neuroses of a grave character. Moreover, the intimate relation which exists between the lymphatic system of the nasal mucous membrane and those of the dura mater and the arachnoid space makes it possible that direct cerebral infection may take place through these channels, and in this way Guye, of Amsterdam, has explained that complex of mental symptoms which he so aptly calls aprosexia. In a recent paper I reported a case of stammering in an aprosexic youth of fifteen having empyema of both antra, and his condition seemed best explained by the theory of cerebral absorption of toxic material through the lymph channels.

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NEUROSES OF THE PHARYNX.

BY F. E. HOPKINS, M.D.

THE functions of the pharynx are so many and so complex, including as they do respiration, deglutition, phonation and audition, that it is not surprising that they are occasionally interfered with by nervous disturbances. The wonder is that such neuroses are not of more frequent occurrence. The pharynx is a single-tube subway, providing transit facilities for freight in one direction, while the lightest and swiftest traffic moves in the opposite. It is not strange that the system of signalling at times fails to work with absolute perfection, nor that signals of danger and distress sometimes appear at points removed from the scene of action. The control of this complexity of function is amply provided for in an intricate nerve supply which includes, besides small branches, the glosso-pharyngeus, pneumogastric and spinal accessory, with free interchange of fibres between the three, and again with the sympathetic, and a distribution of branches from ganglionic centres to other regions. This interchange of communication, with its various ramifications, furnishes the necessary conditions for reflexes in case of local lesions; and where functional activity is so great and pathological invasion frequent, neuroses must occur.

In the consideration of this subject, paralysis due to any central lesion of the nervous system, or to diphtheria, is to be excluded. Neuroses of the Pharynx will be taken up under the following classification: Abnormalities of Sensation, Neuralgia, Reflex Neuroses, Spasmodic Disturbances, and Vascular Neuroses.

ABNORMALITIES OF SENSATION.

Anesthesia of the pharynx is properly classed as an abnormality of sensation. It has been described as a separate disease, but it is rather a condition depending upon some general disease, or due to the influence of drugs, such as bromides, aconite, belladonna, morphia, cocaine, etc. Formerly it was a common practice to administer bromides to overcome the sensibility of the pharynx and render it more tolerant of the mirror for examination and

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treatment of the larynx; but the arrival of cocaine quickly made ancient history of this practice. Cicatrices caused by syphilitic ulceration are anesthetic. It is stated by Newcomb that anesthesia of the pharynx has been noted in some cases of la grippe. Shurly refers to anesthesia and analgesia as congenital physical defects, illustrated in those freaks who stick pins and sharp blades into their mucous membranes and swallow swords without the production of pain.

Hyperesthesia is found in some degree with almost any acute inflammation of the throat, or with the chronic congestions due to the excessive use of tobacco or alcohol. It may be due to actual lesion within the throat, or may be an attendant of another disease, as gastric catarrh. It is often so marked as to prevent examination and treatment of the larynx. This is more noticeable among the nervous, and is another odium heaped upon hysterical females. But rebellious throats are not the exclusive property of the gentler sex. The most obstinate pharynx coming under my observation was that of a young man who is not an alcoholic, and who is in excellent general health. The mere approach of a mirror toward his pharynx was sufficient to arouse a spasm of retching. Even though aided by cocaine and the patient's voluntary efforts, the annoyance of treatment was so great and the pharynx so uncontrollable that treatment had to abandoned.

Treatment for anesthesia and hyperesthesia suggests itself. In both, the patient's general health calls for care. In hyperesthesia, local as well as general treatment will be necessary.

Paresthesia is also common among the neurotic and hysterical. Patients who dwell with morbid apprehension upon the peculiar sensations in the pharynx sometimes develop insanity later, so that the mental side presented with this condition should not be overlooked. The usual complaint is of a tingling or prickling sensation, or of a foreign body, as of a fish bone, a splinter of wood, a thread, a bristle, or of the rising of a lump in the throat (globus hystericus). There is often with hay-fever a distressing burning and prickling in the roof of the mouth and pharynx. For our own credit, as well as for the relief of the patient, cases of supposed foreign bodies demand careful attention. A small fish bone, almost translucent, may be so deeply imbedded in the tonsil or in the lymphoid tissue at the base of the tongue as to escape detection unless inspection is most thorough. Among those

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which I have overlooked was one of a fish bone in the lymphoid tissue at the base of the tongue. Nothing was seen at first examination, and in spite of the patient's assertion of distress I regarded the pain as due to inflammation and expected it would pass with the subsidence of the congestion. The patient returned within a day or two in greater pain, and the small, sharp, translucent bone was found buried in the base of the tongue at such an angle that in the act of swallowing the posterior pharyngeal wall was abraded. It was the bleeding wound on the back of the throat which gave the clue to the location of the foreign body. The experience was more valuable to me than to the patient. Since that event every case of supposed foreign body in the throat has received more sympathetic and careful attention.

The treatment of paresthesia calls for the resources of the general practitioner, as well as for the best efforts of the laryngologist. An improvement of general health is to be sought, and any local lesion, which will probably include varices or hypertrophy within the lymphoid ring, should be corrected.

A true *neuralgia* of the pharynx is rare, if by the term we are restricted to symptoms due to disease or injury of some nerve or a neighboring trunk, plexus or ganglion. If, however, painful affections which are unaccompanied by any visible evidence of disease may be classed as neuralgias, the condition is not so rare. A sore throat with no accompanying inflammatory process sufficiently marked to account for it is frequently observed and, while this is more often seen in those of a nervous temperament, it may attend a rheumatic attack, and in such case yields to the internal use of salicylate of soda more promptly than to any local or general treatment. If no history of a rheumatic diathesis can be found, then general tonics, with suitable regulations as to out-of-door living, are to be employed. The whole pharynx should at the same time be carefully examined with reference to the removal of any morbid condition, especially lymphoid tissue.

Reflex Neuroses.—We are called upon daily to relieve symptoms due to disease of lymphoid tissue in the pharynx. Among the most common of these is cough. It is, perhaps, debatable whether cough due to hypertrophy of lymphoid tissue in the pharynx is to be regarded as a reflex, or purely symptomatic of lymphoid disease. We know from daily experience that cases of persistent

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cough in children are cured by the removal of tonsils and adenoids. Mayer has called attention to the cure of cough by removal of lymphoid hypertrophy from the posterior wall of the pharynx; and the same tissue at the base of the tongue is notoriously responsible for cough, and its removal effects a cure. It is easy to maintain for some of these lesions the nature of a reflex, as that on the posterior pharyngeal wall; if it be admitted for all, then in mere number of cases all other reflexes fall into insignificance compared with cough due to pharyngeal lesions.

There is a series of reflexes—pain referred to other regions—through traumatism or pathological process involving the branches of a nerve within the pharynx. This results from the free communication between the glosso-pharyngeal and the vagaries of the pneumogastric, the spinal accessory, the facial and sympathetic. Pain referred to the ear is a common attendant of an acute inflammatory process within the pharynx of the corresponding side, or of the division of a nerve in operations, or of the involvement of a filament in a malignant or ulcerative process of whatever nature. The usual signal line for this impulse is, doubtless, by way of the petrous ganglion of the glosso-pharyngeal, whence Jacobson's nerve carries the impulse to the tympanum. There is satisfaction in knowing when the patient complains of pain in the ear after tonsillotomy that the route of this impulse is by Jacobson's nerve. Pain from acute processes within the throat is sometimes referred to the region of the jaw in front of the ear.

Tinnitus aurium, which is so distressing to patients and so difficult of cure, has in one well-marked case under my care been greatly relieved by the removal of lymphoid hypertrophy at the base of the tongue. The occasion of the treatment in this case was an obstinate, spasmodic cough, which did not yield to the ordinary measures. The cough was overcome, and the patient volunteered the information that the tinnitus had become far less troublesome. Since the ear affection was of many years' standing, it seemed reasonable to attribute the improvement to the lessened congestion of the pharynx following the removal of the lymphoid tissue.

A reflex disturbance of secretion—sialorrhea—occasionally met with, is to be counted among the rare neuroses of the pharynx. The excessive flow of saliva caused by the use of such drugs as mercury or pilocarpine cannot be included under this

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head, but only those reflexes attending stomatitis, dyspepsia, or occurring in nervous individuals in whom a local lesion is difficult of demonstration. A man of sixty was recently referred to me because of an excessive secretion of mucus, principally from the pharynx. He is highly neurotic, and has wasted much substance on patent medicines. Having retired from active business, that of farming, he seems to have nothing to do but spit, and this he does at a rate of from 30 to 100 times a minute, to the great distress of himself and family. He is tormented night and day, and his long-suffering wife stated that he half filled a wash bowl during the night.

Spasmodic Disturbances.—A rare neurosis of the pharynx is that described as chorea pharyngis, and consists of involuntary movements of the muscles of the pharynx or soft palate, or both. When the palatal muscles are involved, their movement may be attended by a clicking sound, caused by the contact and separation of the moist surfaces of the palate and posterior pharyngeal wall. These sounds may be audible at a short distance from the patient, or if due to simple muscular movement, may sometimes be heard through the ear by means of the diagnostic tube. These movements have been very rapid in some of the cases reported: 150 times a minute in Lack's case, and more than 200 in Semon's (*Jour. Laryng., Rhin. and Oto.,* March, 1901, page 131). There is an approach to uniformity or regularity in these movements which makes the use of the word choreic inappropriate, and Lambert Lack (*Laryngoscope,* June, 1898, page 335), whose paper has been referred to by nearly every writer on the subject since his collection of cases appeared, compared the movement to nystagmus, the twitching is so rapid and unceasing. The larynx may participate in these rapid spasmodic movements, though it is less likely to do so if the case is not central. It is interesting to note that, in some cases at least, the patients were not aware of any unusual condition in the throat, and the peculiar twitchings were discovered accidentally while examining the throat because of other symptoms. If the nasal passages are wide, the muscular spasms may be observed through the nose, thus the movement is shown to continue with the mouth opened or closed; and it has been demonstrated to persist during mastication, deglutition and phonation, but ceases during sleep.

Lambert Lack's case (*Laryngoscope,* June, 1898, page 335) well illustrates this form of spasmodic disturbance: L. H., female,

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aged 19 years, came under observation at the London Throat Hospital. Examination showed a rapid twitching of the posterior pharyngeal wall, which seemed to be sharply jerked to the left side, then relaxed. The movements were unceasing, and 150 or more to the minute. They were not quite regular, either, in extent or time, and curiously resembled nystagmus, which he considers the best name to apply to the affection, since they were quite different from choreic movements. The affected muscles were the superior and middle constrictors, the palatal muscles not being involved, although at times the soft palate had a slight communicated movement. This condition remained constant for over two months, during which time the patient was under frequent observation and was shown to the Laryngological Society of London. It apparently gave rise to no symptoms, and thus its previous duration could not be determined. Cocainizing the nose and the pharynx had no effect on the movements. One nostril at times being sufficiently patent to permit a view of the pharynx, the movements could be seen to continue when the mouth was closed. The patient was in robust health, but suffered from postnasal catarrh with dry, crusty secretion. There was no tremor or spasm of any other muscles than those described, and no history, personal or family, of chorea or rheumatism. The patient did not seem hysterical and, although rather nervous on her visits to the hospital, did not appear to be so at other times.

It has been suggested that these movements of the pharyngeal muscles, which have passed beyond the control of the patient, may have been voluntary in the first instance; an attempt to dislodge the troublesome crusts. The most severe and extensive cases of this character are due to serious central lesions, as cerebral tumors, meningitis, etc. These do not concern us. The milder ones, in which the muscles of the soft palate and pharynx alone are implicated, are attributed to local lesions, as hypertrophied turbinates, adenoids, polypi, atrophic rhinitis with adherent crusts, etc., and the correction of these local conditions, with attention to the general health, results in relief.

Vascular Neuroses.—Under the term angioneurotic edema of the pharynx, Newcomb (*Diseases of the Ear, Nose and Throat,* 1901, page 530) describes a vasomotor disorder characterized by an abrupt edematous swelling. Death may occur from the degree and extent of the edema. He refers to Hubbard's case, that of

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a woman of thirty years of age, who suffered from repeated attacks of facial edema, which were the result of autotoxemia. These attacks were frequent, occurring twice a month for a period of two years. After two or three days the edema would subside and the patient be able to be about again. These disturbances seemed to be the expression of a cumulative autotoxemia, and starvation a necessary part of treatment, while eliminative measures finally broke up the series of attacks. This affection has been called giant urticaria, but Hubbard points out, as differentiating angioneurotic edema, that there is a definitely localized, persistent vasomotor instability; while in urticaria, the area of the attack is shifting, the attacks intermittent, and there seems to be a vasomotor irritability responding to certain irritants, probably from the gastro-intestinal tract.

One form of irritation of nerve trunks or their branches induces an eruption at their terminal filaments on the mucous membrane, as well as on the skin. In the pharynx herpes and urticaria are, perhaps, the least rare of these neurotic inflammations. The cause of the phenomena thus presented is constitutional, though the expression is local. The soft palate, the mucous membrane of which is supplied by the middle and posterior palatine nerve, presents this form of eruption less rarely than does the pharynx. Characteristic of herpes zoster is the unilateral distribution of the eruption and the neuralgic pain which precedes. Systemic treatment is indicated, not only because of the nature of the affection, but because it occurs in neurotic individuals whose general health is impaired. Locally, soothing applications are called for during the acute stage, and mild antiseptics after the vesicles have ruptured.

In fact, as regards the treatment of most of the cases of pharyngeal neuroses they may be classed together. Nearly all the patients are neurotics and, while local lesions are to be sought and removed when found, the general health must be improved by every method which can be brought to bear upon the individual case.

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NEUROSES OF THE LARYNX.

BY EMIL MAYER, M.D.

A RETROSPECT of the twenty-five volumes of the Transactions of this Association shows an interesting condition of affairs with regard to essays on various neuroses of the larynx. In the first fifteen volumes no year elapsed without at least one, and more often there were three and four essays on this subject. In the last ten years but very few references to laryngeal neuroses are found, many volumes having none at all.

This is probably due to the fact that those were the early days of the laryngoscope, the functions of the intralaryngeal muscles were closely observed in health and in disease and became the subject of discussion. With the advance of surgery in this and adjacent fields newer observations were made in other directions while few new facts presented regarding neuroses. It is worthy of note in this connection that Dr. Louis Elsberg, who is so often quoted as "The Father of American Laryngology" in the gatherings of this Association, presented his last scientific contribution to this body in 1884, in an article on laryngeal spasm, at the special request of the President, Dr. Bosworth. He began with an apology for the imperfect manner of its preparation, stating that he had had no opportunity of writing down what he was about to read until the very morning of the meeting, and promising that if he lived he would prepare a more elaborate essay on the subject before the next annual meeting. The "imperfect essay, so hastily written," occupies ten pages of the Transactions for that year, and is so complete and thorough a presentation of the subject that we can readily surmise what a valuable contribution that might have been which was denied us by his untimely death.

Passing briefly, and with mere mention, the various sensory disturbances as hyperesthesia and anesthesia, the subject of neuroses will be presented to you under the following headings: 1. Motor disturbances of a hyperkinetic nature: The spasmodic affections of the larynx. 2. Stammering. 3. Status lymphaticus and sudden deaths. 4. Motor paralyses.

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I. SPASMODIC AFFECTIONS OF THE LARYNX.

These are: Laryngismus stridulus, congenital stridor, spasm of the glottis, chorea of the larynx, laryngeal nystagmus, laryngeal vertigo and dysphonia spastica.

LARYNGISMUS STRIDULUS.

Laryngismus stridulus is a spasmodic functional nervous disorder of the glottis, also involving the muscles of inspiration and expiration. The etiology of this affection is obscure. Although rachitis is so frequent an accompaniment of the disorder, it may not yet be assumed that it is the exciting cause. Craniotabes, which is a part of the symptom-complex, has been regarded as the cause (Elsasser). Escherich, Loos, Gee and Ganghofner have placed laryngismus stridulus in the same category as tetany, and trace it to the same exciting cause.

Reflex-irritation from the stomach acting through the vagus, is the theory of Baginsky. In many cases which have terminated fatally an enlarged thymus has been found. On the other hand, there have been post-mortems which showed a rather small thymus and slightly enlarged bronchial nodes (Baginsky). (Koplik —Diseases of Children, 1902.)

SYMPTOMATOLOGY.

Its advent is usually sudden, and occurs more frequently at night. It is usually ushered in by a short sharp cry, followed by stridulous, croaking inspiratory efforts, associated with short ineffectual inspiration, the countenance becomes congested, the eyes suffused and glassy, the skin cool and clammy. The pulse is decidedly accelerated, the temperature but slightly raised if at all. General convulsions may follow, and there may be complete subsidence of all symptoms immediately after. There follows much exhaustion and stupor, lasting for an hour or more according to the length and severity of the paroxysm. The differential diagnosis between the attacks of laryngismus stridulus and Diphtheria is made by the history of sudden onset in the former; the absence of membrane and of swollen glands, of temperature, of albumen in the urine and of the Klebs-Loeffler bacillus.

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Treatment.—The removal of any cause, as gastro-intestinal irritation, inhalations of steam, warm poultices and sedatives. The Iodated lime is much exploited as being specific in value. The prognosis is good.

CONGENITAL STRIDOR OF INFANTS.

This rare condition has been classified as a mild form of laryngismus stridulus. As it may in its early stages be mistaken for laryngeal spasm, and as some writers still maintain that it is originally a nervous affection, it is deemed advisable to present it here with other functional respiratory disturbances. I have seen two cases of this affection—one at my Clinic, at the Throat Department of the New York Eye and Ear Infirmary, and the other a patient of Dr. Samuel Kohn, of New York City, and which Kohn has recorded (*New York and Philadelphia Medical Journal*, July 16, 1904).

There is a wide diversity of opinion as to the actual causative factors in this condition. Variot, Bruder, Sutherland, Lack and others believe that the condition is due to a temporary mal-formation of the larynx. "The epiglottis rolls upon itself and forms a narrow groove, the ary-epiglottic folds come in contact, forming a constriction which causes stridor. As the child grows, the larynx unfolds and grows and the symptoms cease."

Newcomb (*Transactions of the American Laryngological Association*, 1903) quotes McBride as regarding laryngeal stridor as due to spasm, not paralysis, and would consider it as similar in etiology to laryngismus stridulus.

Newcomb is inclined to accept the theory of Lack, that the stridor is due to a congenital deformity of the superior laryngeal aperture aided by the flaccidity of the parts in infancy but not entirely dependent thereon.

John Thompson and A. Logan Turner (*British Medical Journal*, Dec. 1, 1900), after a most careful and searching inquiry, aided by post-mortem examination, state as follows:

"It may be well that we should add a few words to define as clearly as possible how our position differs from that of Sutherland and Lack in their paper (*Lancet*, Sept. 11, 1897) referred to, which seemed to us by far the most important contribution made to the subject. We are cordially at one with them when they say

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that the affection depends on a valvular action of the upper aperture of the larynx, a falling inward of its lateral walls during inspiration, and that this is due partly to the flaccidity of the parts in infants."

We join issue with them altogether, however, when they ascribe primary etiological importance to the peculiar conformation of the upper aperture found in these cases and regard it as a congenital malformation. We consider it an acquired deformity, and hold that it, as well as stridor, are the result of the ill coördinated stammering breathing. Our most important conclusions may be stated as follows:

First.—That the primary element in the causation of this condition is a disturbance of the coördination of the respiratory movements, probably due to some developmental backwardness of the cortical structures which control them.

Second.—That the change of form is merely an exaggeration of the normal infantile type, and is mainly, if not entirely, the result of a constantly recurring sucking in of the upper aperture of the soft larynx, which is induced by the ill-coördinated and spasmodic nature of the breathing. That it is, in fact, an acquired deformity, strictly analogous to pigeon-breast.

Third.—That there is no proof that any congenital malformation of the upper laryngeal aperture exists in these cases.

Fourth.—That the supposition of a congenital deformity is not essential to account for the symptoms, inasmuch as normal babies crow in a similar manner as they come out of chloroform.

Fifth.—That the sounds are not produced in the pharynx, nor produced in the trachea by compression. It is probably produced in the larynx proper and partly at the abnormally approximated ary-epiglottic folds.

Sixth.—That the neuroses causing the symptoms has not in their experience seemed to depend on the presence of adenoid growths or other obvious causes of reflex irritation.

The diagnosis should not be difficult—its appearance at birth. the sound heard at inspiration only, the absence of cyanosis and of high temperature, and the constancy of the sound, independent of the position of the child who plays about quite unconscious of any disturbance, all present a picture easy to recognize.

From laryngismus stridulus it is readily differentiated. From stridor due to pressure on the trachea from an enlarged thymus

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or bronchial gland it may be differentiated by the fact that pressure produces inspiratory and expiratory dyspnœa, and the sound is louder when the child is on its back. The large gland may be palpated. Toward the end of the second year the condition gradually ceases, leaving no trace of noisy breathing.

SPASM OF THE GLOTTIS.

Under this heading are included only the irregular or transient laryngeal spasms. These are due to a direct irritation or pressure operating on the laryngeal nerves and muscles or from reflex irritation from remote parts of the body. Among the direct causes are enlargement of the thyroid and lymphatic glands, the pressure of aneurisms, of tubercular deposits, the entrance of foreign bodies in the larynx, as the precursor of paralysis and carcinoma. Brose (*Journal of the American Medical Association,* June 22, 1901) reports two cases of laryngeal spasm in adults, due to carcinoma and tuberculosis respectively.

Semon (*Handbuch der Laryngologie Heymann*) discusses the pathogenesis of inspiratory spasm, and is inclined to assume that it is due to an abnormal irritability of the bulbar, and sometimes even of the cortical adductor centers; that peripheral stimuli, particularly those through the centripetal fibers of the vagus, which under normal circumstances only reach the medulla, producing abductor tonus, and which on forced respiration cause contraction of the abductors, in the neurosis under consideration exercise their influence on the bulbar adductor center as well, and produce an effect which overbalances the stimulation of the corresponding abductor center.

In support of this view Semon describes a case in which a cold douche produced a sudden change from inspiratory spasm to functional aphonia; and these continued alternately. He assumes that in this case the abnormal stimulus had reached not merely the bulbar but the cortical center also, and that the sudden shock not only removed overstimulation but substituted paresis. This certainly seems a more plausible theory than that which would explain inspiratory spasm as resulting from a weakness of the adductors.

The writer has recorded a case of laryngeal spasm (Posey & Wright, p. 1,049) which was the precursor of an acute milliary

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tuberculosis. It may also be associated with acute inflammatory disturbances. Dundas Grant and MacIntosh (*Journal Laryngology, Rhinology and Otology*, April, 1901) have recorded a case evidently due to an acute lingual tonsillitis. The diagnosis is apparent, although the search for the cause may be a matter of much difficulty. The treatment is entirely dependent upon the cause.

CHOREA OF THE LARYNX.

A non-rhythmical oscillation of the muscles of the larynx is of infrequent occurrence. It may exist in the larynx alone or associated with chorea elsewhere. The writer saw a case of chorea of the larynx which was followed two weeks later by general chorea.

McGaw (*Annals of Otology, Rhinology and Laryngology*, May, 1902, p. 293) records a case of chorea of the larynx, associated with chorea in other parts of the body. The laryngeal symptoms were a short barking cough.

H. Caboche (*Annales de maladies de l'oreille et du Larynx*, Oct., 1902) reports a case of chorea in which the muscles of the larynx were affected with chronic movements at the same time with those of the trunk and the limbs. The muscles of the face were not afflicted. The patient exhibited paroxysms of hiccough in which particles of food were frequently ejected from the stomach. There were fibrillary contractions of the tongue, a considerable restriction of the field of vision, and other hysterical manifestations. The laryngeal symptoms consisted in a peculiar modification of the voice, which was sometimes varied in pitch, passing from a very high to a very low pitch between consecutive words, so that there would be several abrupt changes of pitch in a short sentence. The sentence often ended in an abrupt explosion of sound. These paroxysms were invariably accompanied by an electric discharge causing choreic movements in the muscles of the limbs or of the trunk. Laryngoscopic examination showed the vocal cords very pale, without a trace of catarrh. During respiration, instead of remaining in repose in abduction, or passing through a slight movement of adduction, at the end of expiration as in the normal condition, they were seen to oscillate continually between the position of moderate adduction and ab-

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duction, and suddenly to approach each other with a violent movement of abduction and immediately to separate. The patient had no cough. The throat and nose were normal. She slowly improved under treatment by bromide, valerianate of zinc and faradism to the larynx.

Chorea of the larynx may be associated with spasm. L. C. Peter (*Annals of Gynecology and Pediatry*, March, 1901) reports a case of laryngeal habit spasm and chorea in a boy of fourteen, who had had six attacks of chorea in the last four years. His recent symptoms were an explosive attempt at phonation, which was increased by excitement. The epiglottis is pinched and gives a slit-like opening. The cords, normal in color, close sharply when spasm comes on, and after a second opening quickly, almost explosively, when the click is heard.

The reasons for considering this to be habit spasm are:

First.—Movements of chorea are increased not only by emotion, but also by voluntary effort. In this instance emotion increases the frequency of sound, but voluntary effort does not. It does not occur during speech effort.

Second.—The movements of chorea are always incoördinate the muscles being individually in spasm or action and not physiological groups, or if the latter, only coincidently. He has never seen coördinated bilateral movements produced in chorea involuntarily. In this boy phonation apparently is involuntary, and the muscular movements are nicely coördinated so that tones are produced which are uniform in pitch. The constancy and bilateral origin are in favor of habit spasm.

Third.—The symptom improved rapidly under a line of treatment which would not influence chorea to any great extent in a short time.

By the use of arsenic and suggestive therapeutics (and most probably the credit belongs entirely to the latter) he improved rapidly. In chorea the will operates but feebly to quiet the movement; as a matter of fact, mental as well as physical effort largely increases it. The diagnosis is not difficult and prognosis generally is good.

Treatment consists of rest of the larynx, arsenic, suggestive therapy, and firm but kind measures—coercion is absolutely harmful.

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LARYNGEAL NYSTAGMUS.

This exists without pharyngeal involvement, though they are apt to be associated. Lack (*Laryngoscope,* June, 1898,) reports a case of nystagmus. He quotes Baginsky as describing a case of nystagmus of the vocal cord in a case of a woman of sixty-one, who had various forms of hysteria for years. The vocal cords during expiration moved in a jerky manner up to or beyond the "cadaveric position. These movements were less marked on hurried respiration and disappeared entirely on phonation. They persisted over two years.

At the meeting of the London Laryngological Association (Internationales Centralbl. f. Laryngol., No. 18, 1902, p. 45) Sir Felix Semon presented a case of nystagmus of the pharynx and larynx. Fifteen months previous she noticed a hammering noise in her throat, recurring four times to the second. Similar movements were noticed in the floor of the mouth, in the larynx and the epiglottis.

The arytenoids moved rhythmically toward the median line. Motions ceased during phonation recurring in sleep.

Lack, analyzing the cases, makes two subdivisions of this affection.

First.—Serious and well-marked cases as a result of gross lesions of the central nervous system.

Second.—Milder cases, reflex in origin, resulting from mild local diseased conditions, as post-nasal catarrh and pharyngitis sicca.

ICTUS LARYNGIS.

Laryngeal vertigo, while most frequently associated with some central lesion, as in organic disease, exists also independently, and is due to a variety of causes. Among these may be mentioned asthma, excessive smoking, elongated uvula, and hypertrophy of the lingual tonsil. The attack is occasioned by some irritation of the peripheral nerve. This irritation is directed to the cardiac and pulmonary centres, rather than to the cortex. As a result of the cardiac and pulmonary disturbance, with the mechanical irritation causing cough, alterations in the cortical circulation occur and the attack follows. The symptoms of laryngeal vertigo are

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first a tickling of the throat, causing cough; dizziness follows and the patient may fall unconscious to the floor, or if seated, the head sinks forward on the chest. After a few seconds he arises pale, and resumes his interrupted task. It occurs most frequently in adult males.

It has been proposed to call these attacks epileptic, but there is the decided objection thereto that the attacks are not associated with convulsions of any kind, there is no history of preceding loss of consciousness, and the removal of the irritating cause relieves the patient of all further attacks.

Avellis (*Archiv. für Laryngologie,* Vol. XIII, p. 368) records the case of a male, aged thirty-eight, who had been well, free from neuroses, and had an attack of pertussis when first seen, in July, 1902. He had been the means of conveying the contagion to his mother and sister. An examination at that time showed that the ventricular bands fall together, the vocal cords congested, swollen, and on the edges of both there are the usual superficial half-moon-shaped erosions.

His history was that he had had numerous attacks of coughing, dizziness and loss of consciousness for three weeks previous to the time he was seen by Avellis. The unconsciousness was so complete that he was made aware of it by the fact that he found himself in some unusual position. At one time he remembered arising and going to a side table for a glass of water, and found the glass emptied on his bed. Another time he fell out of bed and found himself on the floor when he awakened. On still another occasion he fell over a centre-table, and on awakening found himself lying across it. The tip of the tongue was often injured, and he had contusions on his forehead. In the mildest attacks there was a sudden loss of consciousness, and it was impossible for him to finish the sentence he was speaking. He continued having these attacks for the next five weeks, when they ceased altogether.

Medication never influenced the attack. The number of the attacks, beginning with the fifth week of the pertussis, increased at first and became gradually less, just as the cough attacks in whooping-cough, and at first were most frequent at night.

As the case of Avellis was not associated with dizziness, but a laryngeal irritation and loss of consciousness, he thinks it should be considered as differing from laryngeal vertigo. True laryngeal

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vertigo is described by him as occurring in a tabetic and tubercular patient who was attacked on the street with a short cough, dizziness, but no loss of consciousness. Later, he had severe attacks and he fell, as he said, because his weakened legs failed of their support. It was true vertigo. Irritation of the posterior laryngeal wall with a cotton-covered probe brought on an attack of dizziness. One day both membrana tympani disappeared without pain. Tuberculosis of the middle ear of a severe type, and almost complete deafness, followed. The attacks of laryngeal vertigo ceased. He believes that the beginning of tuberculosis of the middle ear was probably the first cause of the laryngeal vertigo. He mentions the case as differentiating the two forms of a laryngeal vertigo with and without loss of consciousness.

Treatment: If any definite causal factor be found, its removal is followed by cessation of the attacks.

DYSPHONIA SPASTICA.

Phonatory spasm due to a more or less complete closure of the glottis and an incoördination of the muscles of the larynx may exist alone, or with functional inspiratory spasm of the glottis.

L. Middlemas Hunt (*Liverpool Medico-Chir. Journal,* July, 1900) reports a case occurring in a male, aged fifty, who lost his voice suddenly six months previously without known cause. He has either been aphonic or has spoken in a high falsetto. On attempted phonation the cords are so strongly approximated that the right vocal process crosses over the top of the left. If the patient makes an effort to speak during the periods of aphonia his face becomes livid and the muscles are convulsed. The normal voice can be restored by pressing on the epiglottis, but it immediately disappears on removing pressure.

Parmewan suggested that the withdrawal of the money the man was drawing from his club might cure the patient.

STAMMERING.

This is defined to be an incoördination of the three mechanisms of speech: the respiratory, the vocal and the oral. In the medulla oblongata is located the centre which presides over the coördination of the basal phonic centre, and the faulty mechanism of one

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results in a faulty action of all. Because of this origin, it is placed among the neuroses.

Volumes have been written on this subject and essays thereon have been presented in an exhaustive, clear and convincing manner by our associate, G. H. Makuen. It would seem to the writer most fitting to present a brief resumé taken from a recent article by Makuen (*Philadelphia Med. Journ.*, Feb. 2, 1901), rather than a more elaborate and exhaustive presentation of this subject, leading as it would to the same conclusions.

The proper early training of young children would prevent the development of defective speech in a large proportion of cases. The general health should be kept in the best possible condition. Baby talk should be encouraged only up to a certain point, and children should not be talked to in any but the best speech beyond a very early age, since all speech is a matter of imitation, and they imitate what they hear.

Stammering is an acquired defect, not congenital nor inherited beyond the fact that certain nervous conditions may predispose children to this affection, and in case a child's ancestors have stammered he should be very carefully managed. The attention of the child should never be called to the defect, nor should the word stammering be mentioned in his presence, since a nervous dread of the affection is easily acquired. In its correction, and in all forms of imperfect articulation, each element of speech which is defective should be taken up separately and the patient taught how to acquire the correct position of mouth, lips, tongue and palate for the enunciation of those sounds, and close attention should be given to the character of each sound he utters.

In the case of the stammerer it is not strictly a form of defective speech, since his difficulty is not with thought, but with his power of expressing that thought. He thinks in words but cannot speak in words. The stammerer has little difficulty in talking when alone or in the presence of dumb animals, and the author thinks that all stammerers can swear. Stammering is often brought on suddenly by a severe shock to the nervous system, due to the fact that the motor processes of speech are carried on mainly in the bulb and spinal cord, and anything interfering with this process will naturally result in disordered speech. The nose and throat and the condition of the tongue should in all cases be carefully looked after, but surgery has no value beyond the cor-

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rection of actual deformities of the organs. The treatment of stammering, as of other defects, must be, in the main, educational. The nervous mechanisms of speech must be reached through the training of the muscles supplied by those nerves and employed in the processes of speech, the aim in all cases being toward volitional control of the muscles.

Ingenuity is required in the individual case, and only persons of great patience and perseverance are suited to work over and treat these cases, under the guidance of the physician.

NEURALGIA OF THE LARYNX.

This is either one-sided or bilateral. The pain is acute, sudden of onset, and may be present in speaking or swallowing, or independent of any motion of the larynx. The painful point is indicated, and is usually at the point of entrance of the superior laryngeal nerve through the thyro-hyoid membrane of the affected side. A second point of pain may be found in the sinus pyriformis. It is by no means easy of diagnosis, the history being of most value. The simplest cases are those of malarial origin, the pain coming on at certain stated intervals, with entire absence of discomfort between the attacks. The coal tar preparations usually will be indicated.

STATUS LYMPHATICUS AND SUDDEN DEATHS.

Germane to our subject is the sudden death, associated with the status lymphaticus, in which spasm of the larynx plays a prominent part. The importance of a clear understanding of this subject cannot be overestimated, it forming an explanation of the sudden deaths from anesthesia in operations for adenoid growths, where the status lymphaticus is practically always present.

Ohlmacher (*Journal American Medical Association*, Feb. 13, 1904) presents his views on this subject, and concludes as follows:

"Whatever its mechanism, I am, from my observation on lymphatic epileptics and my reflection on these studies, strongly disposed to the belief that a periodic increase of intracranial pressure acting either on the exterior or interior of the brain, or on both portions simultaneously, and manifesting itself as a result of the

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tendency to edema characteristic of status lymphaticus, is a directly provocative factor of such neuroses as spasm of the glottis, tetany, infantile eclampsia, epilepsy, and the various forms of sudden death incidental to the lymphatic state. According to this view, the clinical phenomena would depend on the extent and location of the intracranial edema, or in other words, on the portion of the encephalon particularly subjected to pressure. In event of compression of the external portion of the cerebrum various convulsive disorders of the motor apparatus are provoked; when the balance of pressure becomes so distributed as to raise the intracerebral pressure other severer symptoms occur, ending, in case of sufficient pressure on the floor of the fourth ventricle, in sudden respiratory or cardiac failure. Granting the hypothesis just advanced, we are brought one step nearer the explanation of the modus operandi of several obscure neuroses whose kinship has repeatedly been recognized on purely clinical grounds, and whose morbid anatomic association is proved by the establishment of the lymphatic state as a common basis for all. Cheadle's dictum that "laryngismus, tetany and general convulsions are the positive, comparative and superlative of the convulsive state of childhood" finds support and elaboration!

MOTOR PARALYSES.

These may be due to pathologic changes in the muscles, or to functional lesion of the nerve centres or motor nerve trunks. The latter is always a true neuroses. The individual muscles that are thus affected are the central adductors (arytenoids), the internal tensors (thyro-arytenoids) and the unilateral or bilateral adductors (lateral crico-arytenoids). The crico-thyroid muscles are involved when the superior laryngeal nerve which supplies their motility and sensation to the mucous membrane of the larynx is affected.

To the many known causes of laryngeal paralysis may be added some of an unusual nature that have been recorded. Irsae (*Internat. Centralbl. f. Lar.*, 18, p. 397) mentions a case of left-sided paralysis due to pericardial exudate. St. Clair Gillies (*Australasian Med. Gazette*, Nov. 20, 1901) reports two cases accompanying mitral stenosis. Krebs (*Internat. Centralbl*, No. 18, p. 220) reports a case of vocal insufficiency following enuclea-

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tion of an angio fibroma at the angle of the jaw. Sanger and Helger (*Zeitschr. f. Hypnose.* X, Heft 4, 1901) report a case of aphonia following laryngo-fissure for papilloma in an eight-year-old girl. Faradization and galvanism proving valueless, she was found to be able to speak under hypnotic influence. Systematic vocal exercises were followed by cure.

Nehab (*Internat. Centralbl. f. Laryng.*, No. 18, p. 301) records a case of traumatic right-sided paralysis. The patient was shot in the left shoulder five years previously. There was no wound of exit. He stated that his dysphagia and husky voice first appeared eight weeks previous to his consulting Nehab. No bullet was found by the fluoroscope. The Roentgen rays showed splintered bone about an inch to the left of the sternum, and the writer believes the paralysis to be due to the pressure of this splintered bone. The functional aphonia known as hysterical aphonia is so well known to you that the recapitulation of the theories as to its origin would be a work of supererogation. In none of these cases can the diagnosis be made by the laryngoscope alone. The clinical history, with the patient's ability to cough, helps much toward its elucidation.

Treatment.—Among some recent suggestions, Rueda (*Revista de medic. y Cirurg. Praticas,* No. 14, July, 1900) says: "Everything must be tried from the simple drawing of the tongue, a laryngoscopic examination, hypnotic suggestion, massage and intralaryngeal applications. In one case all failed, and the teaching of sounds, tones and syllables gradually, and finally words, brought results."

Loeb (*Journal American Med. Assn.*, Jan. 16, 1904) states that he delivered a short and more or less sentimental talk to aphonics on the word "home," which, he states, is the first word that they will utter, the most beautiful and easiest to pronounce in the English language. Having secured the requisite confidence and interest, he places the patient on a chair and inserts the index finger of the right hand into the pharynx and presses the epiglottis over the glottis until the patient becomes somewhat uncomfortable, when he withdraws his finger and says in a commanding voice, "Now, say 'home, home, home.'" The patient repeats not only "home," but any word suggested, and leaves the office talking as well as anyone.

For this and other forms of paralysis, E. Richter (*Archiv. f.*

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Laryngol. XI, 3) has devised an electrode for treating the recurrent nerve on a new principle, *i. e.,* applying the electricity directly to the trunk of a motor nerve with a very much weaker current than is usually employed. In case of hyper-excitability, weakness or paralysis of the laryngeal muscles, they can be stimulated by the direct application of the primary current. The electrode for this purpose consists of two separately insulated soft, fine hair brushes mounted on copper wires, and dipped in a 10-percent. solution of sodium bromide and potassium iodide. This bipolar electrode is light, easily handled and does not hurt the larynx, while it can be sterilized by boiling. It can be changed to a unipolar electrode by connecting it with a single wire. The primary current is applied for five seconds; two to five milliamperes are ample. When the nerve, instead of the muscles, is to be treated the continuous, or sinusoidal, alternating current is preferable, and the electrode for this purpose is shaped like a curved sound. It is inserted through the nose into the pharynx, where it is turned until it lies along the side of the pharyngeal wall, or a larger sound can be inserted through the mouth and used behind the tonsil. At this point the branches of the vagus can be directly stimulated by the electricity, and also the immediate vicinity of the main trunk. If the anode is thus introduced and the cathode is applied over the apex of the heart with a current of from two to five milliamperes, the heart pulsates more slowly by sixteen to twenty beats in the minute, as Richter found by experiments on himself. Tests with this anode in the pharynx and the cathode on the ulnar nerve at the elbow, or applied to the posterior margin of the sternocleido-mastoid muscle, demonstrated the feasibility of this stimulation of the trunk of the motor nerves with a very weak current. Reversed currents seem to be ineffective.

The cathode must be applied to the muscles that require treatment. An extremely weak current is sufficient when the anode is in the pharynx and the cathode in the larynx; a little stronger current for intralaryngeal action, and a current five to ten times as strong as the first, to induce percutaneous contraction of the muscles, applying the electricity near the thyroid cartilage. In case of very sensitive patients, the anode can be inserted in the pharynx and the cathode applied to the side of the thyroid cartilage.

These electrodes will be found useful in diagnosis, and for the

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treatment of vocal and respiratory troubles from weakness or paralysis of the muscles from any cause, and of motor or sensory weakness or paralysis of the nerves. Hysteric troubles are peculiarly amenable to this treatment, as also mogiphonia, aphonia and dysphonia, besides the laryngeal troubles accompanying tabes, syringomyelia and other affections of the central nervous system. The muscles of the larynx can also be influenced and made to contract by placing the cathode in the throat and the anode in the anus.

HYSTERICAL APHASIA.

G. Avon (*Bull. de Laryngol.*, March 3, 1901) maintains that hysteric aphasia really exists, and assumes the same form as aphasia of organic origin. It sometimes takes the form of a special kind of aphasia, such as pure verbal blindness, verbal deafness, etc. Its beginning is abrupt, as is its disappearance, and its duration is short, consequently the intelligence remains intact. The disease recurs and co-exists with stigmata of hysteria. As to its pathogeny, there are numerous hypotheses, among which the most recent is that of engorgement of the cerebral centre. The prognosis is good.

In concluding this paper, I beg to express my thanks to the council for the honor conferred in asking me to present this subject before you. I am aware that I have left much unsaid, but I trust that you will find that the important neuroses, not due to organic disease, have been mentioned. To the imperfections of presentation I ask your kindly indulgence, and trust that you will ascribe most of them to the vastness of the subject and the limited time at my disposal.

General Discussion.

Dr. J. H. BRYAN considered the subject of neuroses of the upper air passages as one of the most difficult problems with which laryngologists have to deal. He did not know which was the most difficult to understand, the neuroses of the nose or those of the larynx. Both are sufficiently difficult to put him at his wits' end to know how to explain them, and to know what to do in the way of offering relief to the subjects of these distressing affections. Of late he seemed to have had more than his share of these

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unsatisfactory cases, and hoped to gain much light from the discussion of the subject. In speaking of anosmia, he did not recall that Dr. Makuen mentioned injuries of the head as a cause. He referred to the case of a patient who was thrown from her horse twenty-five years or more ago, and who has suffered from complete anosmia and loss of taste ever since. Nothing has been able to relieve this condition. A second case referred to was that of a lady thrown from a car, striking her head on the pavement. He saw this patient at least two or three months after the accident. when there were no evidences of external injury nor any local conditions present that would suggest the loss of smell and taste. This case was somewhat benefited by massage to the middle turbinates. Another curious condition is that known as animal fever, caused by the emanations from the horse, cat, dog, rats and mice. Nearly all of these cases show no pathological condition in the nasal passages, or at least none recognizable to the eye. One patient, however, a child more recently under Dr. Theisen's care, had a small adenoid and was suffering intensely from coryza and asthma when it reached the hospital. Dr. Bryan believed that Dr. Theisen had since removed the adenoid growth. Another case of animal or horse fever showed nothing peculiar in the nose. As this patient suffered so intensely, Dr. Bryan consented to make a superficial cauterization of the nasal mucous membrane with trichloractic acid, but with no relief to the symptoms. With regard to parosmia, he had found diseases of the sinus the most common cause, but this can hardly be called neurotic, because it is due either to diseased bone or to an accumulation of pus in the ethmoid cells or the antrum. Most frequently in many of these cases there is no discharge from the nose or nasopharynx, or other symptoms that indicate sinus disease; the only symptom complained of is the bad odor peculiar to such cases. Many such patients complain of burnt coffee or diseased meat. Dr. Bryan had only recognized the condition in some instances by aspirating and flushing out the cavity, bringing away thick, inspissated pus which lay along the floor of the cavity. There must be something emanating from one of the sinuses to cause this bad odor. There was no fluid found in the cavity.

With regard to laryngismus stridulus, this undoubtedly was a neurosis, but in many cases is due to mechanical cause. One very interesting case presented at the Laryngeal Section of the American Medical Association several years ago was due to the falling of the epiglottis, this organ being tipped so that it irritated the ary-epiglottic folds to such an extent that a spasm was brought on and the child's life endangered. On one occasion the epiglottis was caught between these two folds and the child came near dying in this attack. Dr. Bryan passed his finger into the child's larynx and pulled the epiglottis forward, thus relieving the spasm and saving the child's life. It is very difficult to say what is the cause

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of this relaxed state. It may have been due to the child being bottle-fed, or to a hypersensitive nervous condition. At any rate, with improvement in nutrition and the growth of the child the condition has been entirely overcome.

Dr. CLEMENT F. THEISEN stated, with reference to the case of his mentioned by Dr. Bryan, that since the operation the child returned to school and it is not known whether or not the condition was improved. It is, however, believed that there was a decided reflex asthma. Dr. Theisen was very much interested in Dr. Mayer's presentation of the subject of neuroses of the nose and his reference to laryngismus stridulus. He stated that there have recently been in the Children's Hospital in Albany three cases of "Thymus Tod." In these cases the children went to bed perfectly well, but in the morning were found dead, without having cried out or given any warning whatever. In one of these cases there was no obstruction of the trachea found, and death is supposed to have been due to hyperthymization. It is believed one of the children had several attacks of laryngismus stridulus, and the cases of "Thymus Tod" were only mentioned for this reason.

Dr. J. W. FARLOW stated that the type of cases troubling him most were those of neurosis of the nose accompanied by enlargement of the middle turbinate bone, a great deal of lacrimation, and swelling about the eyes. These cases are accompanied by considerable nasal obstruction, but one is always at a great loss to know how to treat them locally, and to what extent. Dr. Farlow's experience led him to the conclusion that local treatment is of but little use, and that most of these cases were in nervous and sensitive patients. He considered the question of external treatment in order to make the skin a proper protection to the body.

With reference to the signals referred to by Dr. Hopkins, Dr. Farlow agreed that if these are not in good working order they are of practically no use at all. As a result of the frequent and continued congestion of the nose the middle turbinate bone becomes much swollen, the eye becomes suffused and the condition is permanent. It is wrong to treat such cases locally, as it only makes the place which gives the signals all the more sensitive. Dr. Farlow suggested treating these cases by gymnastics, by exercising the skin and by hydrotherapeutics, and considered that altogether too little attention has been paid to hydrotherapy, and states that more cases are successfully treated by this method than by local means. He protested against the too forcible treatment of these cases, since they are not diseases which require local treatment to the nose.

In spasm of the glottis occurring in weak, nervous patients the lower part of the pharynx becomes somewhat paretic and in the lower part, near the larynx, the food collects, they do not swallow readily and some parts continue somewhat sensitive. Patients in this condition have a great dread of eating on account of the size

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of the food, fearing to eat too large pieces lest they should cause obstruction, and therefore take but small bits at a time. In reality, it is considered better for such patients to eat something large rather than something too small, because the effort to contract the throat around a very small article of food produces a more lasting irritation than when a larger portion is taken. Another advantage to be derived from eating large portions is that the passage is thus kept open as far as possible. The treatment in such cases may be very difficult.

Dr. JOHN O. ROE said we should not consider there is an absence of disease in the nose because, on simple inspection of the passages, no diseased condition is seen. The mucous membrane covering the different portions of the nasal passages, including all its ramifications, is so extensive and the portion of this membrane that can be seen on ordinary inspection is so comparatively limited that we are not warranted in deciding offhand that no disease is present because none is observed. It is sometimes only after frequent and careful exploration of these passages and their accessory sinuses that a diseased condition of some hidden portion can be found. In a great many cases migrain, tic-douloureux, etc., are caused by limited areas of disease of these cavities, frequently very difficult to find. Dr. Roe had seen cases of migrain, headaches and facial neuralgia that for a long time had puzzled him, but which were found to be caused by polypi in the ethmoid cells, or other conditions causing intranasal pressure. In several interesting cases, where there was undoubted ethmoid disease, on opening into the cells, they were found full of small polypi, which before had been unsuspected, and the removal of which led to a disappearance of the pain. He also stated that in the case of tic-douloureux which he should report at this session the cause of the difficulty was finally found in the sphenoidal cells. He wished, therefore, to emphasize the fact that the cause of many of the most painful and perplexing disturbances was to be found in the nasal passages, the location of which could only be determined after considerable study of the case, and could not in the majority of cases be readily discovered by a mere inspection of the parts.

In regard to chorea, Dr. Roe stated that the latest investigations of the committee appointed by the British Medical Association to investigate the cause of rheumatism, chorea and allied conditions had shown that these affections are caused by a bacillus, which they had termed the "bacillus rheumaticus," and that the tonsils were the seat of the infection, or the entrance for the germ in a great proportion of cases. In illustration of this fact, two interesting cases of chorea in children cured by the removal of diseased tonsils had recently come under his observation. Both of these patients were girls, six and ten years of age, under the care of Dr. Angell, the well-known neurologist, at the Rochester City Hospital. In both of these cases the choreic symptoms had

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persisted for one and two years. Dr. Angell could find no special cause for the difficulty, excepting the fact that both children had large tonsils and adenoids. Dr. Roe, on examining these children with Dr. Angell, advised the removal of these conditions, which was accordingly done, when the choreic symptoms speedily subsided. In all such rheumatic and choreic cases the nose and throat should be carefully examined for conditions which may be the cause of more or less septic or ptomaine poisoning.

Dr. J. W. GLEITSMANN referred to one affection of the throat not mentioned in Dr. Mayer's paper. This is a nervous cough of the larynx not based on any organic disease. It is not only necessary in these cases to examine the chest and other portions of the body, but especially the organs of the throat. It is known that cough can be produced by any part of the organism, but one should be very careful before attributing a cough to nervous origin. The speaker referred to a case of true nervous cough. The patient was a young woman, about twenty years of age, whose family history presented no neurotic conditions whatever. She was carefully examined with regard to her chest, and Dr. Gleitsmann examined her nose and throat for any affection existing there. Nothing was found excepting a few granules on the posterior wall of the pharynx, the treatment of which, however, did not materially improve the patient. The parents were, therefore, informed that there was no indication for treatment, since the cough was considered to be entirely due to the neurotic element in the patient's constitution. She was advised to take a sea voyage, which she did, going on a slow steamer to Germany and back. Upon her return her cough had entirely disappeared, and six months later she was in good health. Dr. Gleitsmann considered these cases extremely troublesome when it is impossible to detect any local affection.

Dr. THOMAS J. HARRIS referred to the remarks of Dr. C. L. Dana, made before the New York Academy of Medicine last winter, in which it was stated in the most positive manner that the speaker failed to see in his large experience any relation that he could detect between the nose and nervous affections, and that he did not put any faith in the reports of neuroses of the nose. Excepting by putting a patient in the most healthy condition wherever there was trouble, as when we attended to tonsils and adenoids, he failed to find any occasion to make use of the laryngologist in his work as a neurologist.

With reference to spasm of the larynx, Dr. Harris referred to the case of a trained nurse who developed her attacks as a result of very much reduced general health. She had the characteristic attack coming on in the middle of the night and the fear that she would die. There was clearly no organic trouble, but there was very marked post-nasal catarrh. The use of bromide of potash was most successful in this case.

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It is stated that it is not unusual to see polypi of the nose complicated by asthma and the asthma relieved by their removal. Dr. Gleitsmann had seen several such cases and he would, therefore, not concur with Dana's views as referred to by Dr. Harris. He also referred to a case of excessive cough brought on by hypertrophy of the lingual tonsil and cured by its removal.

Dr. SAMUEL W. LANGMAID said that he was not surprised at the view expressed by Dr. Dana, because he thinks there has been a great deal of lax judgment with regard to the treatment of neuroses from the nose. He considered that there can be no doubt that such things do exist, and agreed with Dr. Gleitsmann in the statement that it is an everyday occurrence to find in asthmatic patients that the asthma is produced by polypi in the nose. He believed, however, that the most frequent cause of neuroses has not been in the nose and, therefore, thought this might account for Dr. Dana's remarks.

Dr. Langmaid briefly reported the case of a young girl whose father was a musician. She was his pupil, and it was later learned that she had been very much oppressed by her father in his desire to have her become an expert performer. This patient presented a barking cough, of which condition Dr. Langmaid has seen but two such cases, the other one being that of a man on the streets in his city. The case first referred to was sent to Dr. Langmaid by Dr. Holmes, and he made a careful examination of the nose and throat but found no lesion, but suggested that the condition was neurotic or hysterical in its origin. When the patient was etherized the bark ceased immediately, but on returning to consciousness it again returned. The method of suggestion was resorted to, that is, he suggested to the patient that if she kept her mouth firmly closed the bark could not escape, and in this way the cough was stopped a number of times, and finally entirely. This case is considered to have been purely hysterical, but was cited as being the only case which had come under Dr. Langmaid's observation for treatment. He believes this barking cough to be a very rare condition.

Dr. E. FLETCHER INGALS referred to three cases coming under his care, none of whom used liquor, two of them being ministers and the other a poor man. None of them could be styled "high livers."

Dr. WILLIAM LINCOLN referred to the statement that overgrowth of the lymphoid tissue of the pharynx is considered as a possible cause of chorea. He mentioned a case in which he had an attack of chorea as a result of an operation to remove an adenoid. The patient, a girl of about thirteen years of age, had never had chorea before, but developed it as the result of this very simple operation in the pharynx. The day following the operation a typical choreic attack of the pharyngeal muscles came on, not merely an attack with rhythmic contractions, but one in

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which the regular explosions of chorea were present. This was followed by an attack of chorea in the left arm.

Dr. W. K. SIMPSON mentioned that the most remarkable case of post-operative neurosis ever seen by him was that of a girl who had a tonsil removed by a physician in New York, who thought it advisable to remove at the same time the uvula, which was considered long enough to call for removal. He removed the uvula, but without the consent of the patient's parents, and the removal was so complete that the arch of the soft palate was completely uniform. There was not a vestige of the uvula left. As the result of this post-operative neurosis, the patient developed the most marked case of general hysteria he had ever seen. She became completely helpless and unable to walk. All of these symptoms were very much heightened by the great sympathy of the mother. Three or four physicians, himself among the number, were called in for corroborative testimony, as there was some likelihood of a lawsuit. If this case had been carried to court the parent possibly would have won the suit, as their consent was not obtained before the removal of the uvula, and because it was so completely removed as to produce the distressing symptoms enumerated. The case was cited by him not only for the interesting features detailed, but also as a hint to the laryngologist never to remove the uvula without full consent of those concerned.

Dr. W. F. CHAPPELL referred to two cases recently coming under his observation in which, during the pre-menstrual period, the patients had an intermittent rhinitis and occasionally complete stoppage of the nasal passages, with some moderate amount of sneezing. When menstruation occurred the nasal mucous membrane was very much swollen and there was a great deal of sneezing. Both cases showed very clearly what hydrotherapy can do, as they were both cured by standing the patients in warm water and showering the back with cold water.

Dr. CLARENCE C. RICE, in reference to Dr. Farlow's suggestion that atrophy of the lower part of the pharynx is the cause for laryngeal spasm, mentioned that he had had a great deal of trouble with cases the reverse of this. In his experience, very stout people have been very troublesome patients, and he has concluded that the size of the pharynx bears a distinct relation in its influence upon the condition of the larynx. He thinks that in stout people with small pharynx one is apt to get laryngeal spasm, and possibly laryngeal vertigo. He calls attention to the very sensitive areas which are known as lateral pharyngitis, and says that these areas are so sensitive that any irritation of them is quite enough to cause laryngeal spasm. The smaller the pharynx the more sensitive it is apt to be, and the more impressionable it is to all external and internal influences. In the very small pharynges of stout people such reflex symptoms as cough, tickling, spasm, and even vertigo, are not uncommon. He had noticed this in

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hypertrophic pharynges more frequently than in atrophic conditions.

Dr. MAKUEN, in closing this discussion, stated that he recalled Dr. Dana's remarks referred to by Dr. Harris, but he thought that there were some things about the matter which even this distinguished physician had not investigated. He believed that Dr. Dana may not have been accustomed to examine the nose in such cases. So far as Dr. Dana's statement goes that he would not usually refer his nervous cases to the laryngologist, Dr. Makuen stated that, for himself, he would as soon think of treating typhoid fever without examining the tongue as he would a case of asthma without looking into the nose. He therefore considered the discussion timely and important, if for no other reason than to bring the matter before the neurologists.

In reference to Dr. Bryan's allusion to anosmia due to injuries of the head, Dr. Makuen mentioned this in his paper, referring to several cases reported in which there were fractures of some of the smaller bones of the cranium, such as the ethmoid, and injuries in that way to the olfactory nerve or bulb. He considered parosmia a very important disease. The odor in these cases was almost always disagreeable, he knowing of only one exception, and that was a case in which there was a persistent odor of heliotrope.

With regard to Dr. Farlow's reference to the signals mentioned by Dr. Hopkins and the statement that he no longer treated the nose in these cases, Dr. Makuen stated that he had endeavored to demonstrate in his paper that these neuroses were due either to some disturbance in the reflex arc or to some peripheral disturbance, and therefore to treat only the skin by hydrotherapy seemed to him to be treating the peripheral condition only. He suggested that the cases referred to by Dr. Farlow in which there was swelling of the nose and ocular symptoms might be the result of a diseased condition of the turbinal bones. If this was the case, he advised that a little more room be allowed the nostrils, in order that swelling may take place without causing marked inconvenience. He considered the systemic measures are also of great importance in all cases in order to bring the general nervous system up to par.

With reference to Dr. Gleitsmann's mention of a nervous cough, Dr. Makuen cited a recent case of his own in which the patient had a large, thickened spot of mucous membrane on the posterior wall of the pharynx. The symptoms were cough and asthma. When this hypertrophy was touched with a probe the patient would have both cough and asthma in a very marked degree. The spot was cauterized, and he was afterwards unable to provoke either the cough or asthma by touching this spot. The patient since this treatment had been able to indulge in many things before denied him, such as skating, coasting, etc. Dr. Makuen considered this a clear case of cough and asthma due to pharyngeal

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irritation. It must be remembered that one may remove the original cause of a diseased condition without at once bringing about a cure. If a patient has been coughing for many years it has become a habit with him, and this habit must be cured by training and suggestion.

Dr. Makuen also recorded a case of laryngeal vertigo seen in connection with Dr. Wharton Sinkler of Philadelphia, in which the removal of the tip of the uvula seemed to produce a cure. The patient was twenty-five years of age, an assistant rector of a large church. During a recent attack of this condition he was reading a responsive service before a large special congregation, and when it came his turn to read he did not begin, so the rector, who was present, took up the reading. During the time the rector was reading the assistant fell to the floor and was carried out, but remained unconscious for fifteen or twenty minutes. The uvula was very long and the pharynx much congested. The tip of the uvula was removed, and since this time the patient had continued to improve; he had had no more attacks and he now has a charge, which he is filling as rector in a most satisfactory manner both to himself and to his congregation. It was, therefore, believed that in this case the attacks of vertigo were caused by the elongated uvula.

Dr. MAYER, in closing the discussion, said that vertigo might occur in connection with nasal disturbances. He had recently seen recorded the histories of three cases, in one of which there was weakness of one leg, and in the other two there was vertigo following operation and lasting until the nasal condition was corrected. With reference to the cases referred to by Dr. Farlow, the speaker considered them to be of great rarity, and as they are invariably due to central lesions, which were without the scope of the subject assigned him for his paper, they had to be omitted. He would say, however, that these cases are of the gravest import. The cases of thymus disease mentioned were also rather foreign to the subject.

In regard to the question of nervous coughs raised by Dr. Gleitsmann, the speaker referred to these as being possibly reflex, due to some ascertainable cause, but believed that the smallest minority were of purely nervous origin. This latter condition was so rare that he could recall but one case of this affection, and that was previously reported by Dr. Farlow as one of four cases of unusual forms of cough.

In referring to the case of congenital stridor which was due to an elongated uvula, Dr. Mayer stated that many men maintain that congenital stridor is not a neurosis, and in this connection he had presented both sides of the question and had also conferred with pediatrists, and the general consensus of opinion was that it was a neurosis.

With regard to the cases of laryngeal vertigo cured by removal

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of the lingual tonsil and of the uvula described by Dr. Bryan and Dr. Makuen, Dr. Mayer said that they were most interesting and should be carefully recorded, since there are but comparatively few cases of laryngeal vertigo referred to, and these would be of great value to the literature of this subject. In regard to Dr. Rice's statement that laryngeal spasm is frequently met with in stout people, this had not been Dr. Mayer's experience.

Candidate's Thesis.

A STUDY OF THE DEVELOPMENT OF THE NOSE AND ITS ACCESSORY CAVITIES.

BY J. M. INGERSOLL, M.D.

THIS paper must be considered as only a preliminary one, for the field is so broad that the author has been unable to cover it exhaustively.

The primary origin of the olfactory organ is not well understood; possibly it may have arisen by a modification of primitive integumentary sense organs.

In its simplest form the olfactory organ consists of two pit-like depressions of the integument of the snout opening on the surface by external nostrils. It is lined by an epithelium which is connected with the brain by the olfactory nerves. The olfactory organs of all the true fishes consist of sac-like depressions which do not communicate with the mouth. In the course of development each external nostril is divided by a fold of skin into two openings, thus forming an anterior and posterior nostril.

Dipnoi are fishes which resemble amphibia in several ways. They live in shallow streams and bury themselves in the mud during the dry season. The air bladder is converted into a functional lung and the nasal cavities communicate with the mouth as well as with the exterior. In consequence of this, anterior or external, and posterior or internal nostrils (choanæ) can be distinguished, and a free passage is thus formed through which air passes and the olfactory organ takes on an important relation to the respiratory apparatus.

In amphibia the structure of the olfactory organ becomes modified in correspondence with the change in the mode of respiration.

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The nasal chambers become differentiated into an olfactory and respiratory portion and an extension of the olfactory surface takes place by the formation of one or more prominences on the floor and side walls of the nasal cavities. These prominences correspond to the turbinals of higher forms.

Glands, situated under the olfactory mucous membrane, can now be found, and the secretion from these glands moistens the mucous membrane of the nasal cavity.

In reptiles, owing to the growth of the brain and facial region and the formation of a secondary palate, the olfactory organs, from reptiles onward, gradually come to be situated more ventrally beneath the cranium.

The secondary palate is formed by the pterygopalatine arch and is well developed in all reptiles. In snakes and lizards this arch is more or less movable and free from the base of the skull, but in crocodiles it meets with its fellow in the median line, and the shelf-like palatine processes of the superior maxillary bones unite with the palatines. Thus a secondary roof is formed to the mouth, distinct from the true (sphenoidal) base of the skull. The cavity thus formed closes in the posterior prolongation of the nasal chambers, which consequently become sharply differentiated from the mouth and the posterior nares open farther back into the pharynx or nasopharynx instead of the mouth.

In birds there is an anterior nasal chamber, lined by stratified epithelium, and an olfactory chamber situated above and posterior to the former.

The olfactory chamber contains the ethmoidal turbinal, the form of which varies greatly. It may be simply a prominence or more or less rolled upon itself.

Corresponding to the much more marked development of the facial portion of the skull, the nasal cavity of mammals is much larger, and there is a more extensive development of the turbinals.

The turbinals become very complicated and form a sponge-like labyrinth, the cell-like compartments of which are lined throughout by mucous membrane. The number of olfactory turbinals varies considerably, but in most mammals there are at least five. These olfactory turbinals are generally described as ethmoidal turbinals because they are usually supported by the ethmoid bone. The turbinal of lower vertebrates corresponds to the maxillary turbinal in mammals, situated in the lower or anterior part of

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each nasal chamber, and supported by the superior maxillary bone.

The maxillary turbinal in mammals no longer possess an olfactory epithelium, and in microsmatic mammals (seals, whales, monkeys and man) the lower portion of the ethmoidal turbinal also loses its olfactory epithelium. This change in the mucous membrane of this portion of the nose corresponds to the change in function, for its principal function now is to clean, warm and moisten the inspired air.

The author wishes here to acknowledge his indebtedness to Dr. Robert Wiedersheim's book, "Comparative Anatomy of Vertebrates," from which the statements above have been compiled. With this description of the development of the olfactory organ as a guide, let us study some members of the different classes of vertebrates more carefully.

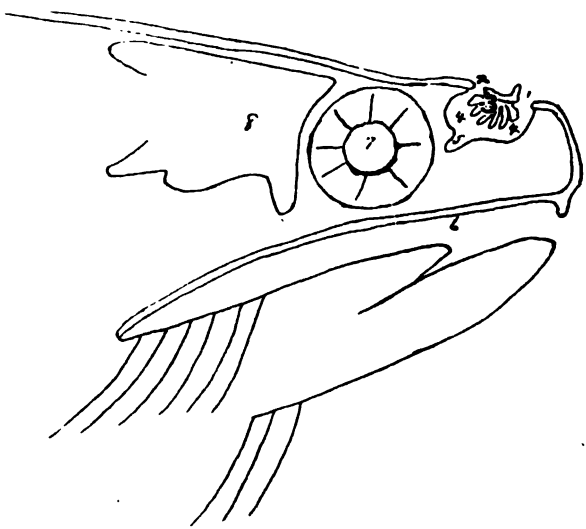

PLATE I.

Somewhat diagrammatic drawing of a section through the nasal fossa of a fish.

1. Anterior naris.
2. Posterior naris (which opens externally).
3. Turbinal.
4. Nasal fossa.
5. Prolongation of the nasal fossa downward toward the mouth.
6. Mouth.
7. Orbit.
8. Brain cavity.

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Fish.—The olfactory organ in the Lake Erie white fish is composed of two symmetrical cavities situated in the anterior part of the head and separated from each other by a thick septum.

Each cavity is somewhat hemispherical in shape and communicates with the exterior by two small round openings in the

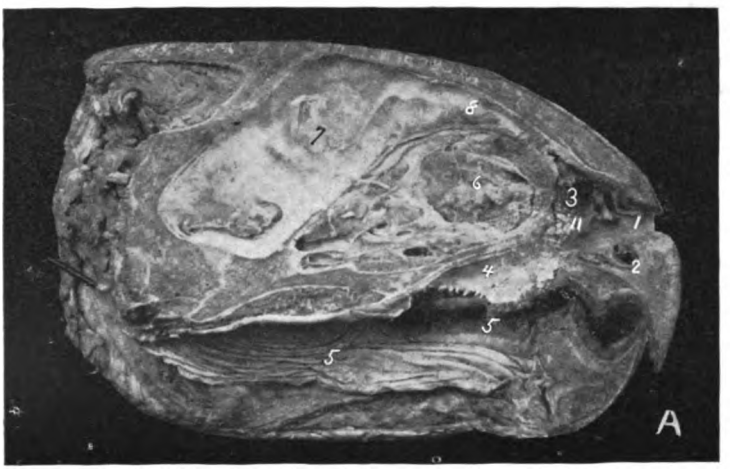

PLATE II.

A. Longitudinal section through the left nasal fossa of a turtle.
1. Anterior naris.
2. Jacobson's organ.
3. Olfactory chamber.
4. Posterior naris.
5. Mouth.
6. Orbit.
7. Brain cavity.
8. Olfactory lobe of brain and olfactory nerves.
9. Septum.
10. Partition between nasal fossæ and Jacobson's organ (Figure C). In the right fossa this partition has been cut away.
11. Turbinals.

roof of the cavity. (Plate I and II.) These openings are situated one behind the other and so may be designated as anterior and posterior nostrils.

The external wall and floor of each cavity is smooth, but the median wall (septum) supports a rounded prominence, from

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which radiating processes extend into the nasal cavity (Plate I, 3). These processes correspond to the turbinals in higher vertebrates. The two nostrils open just above these processes and thus allow a free circulation of water through the cavity (Plate I, 1 and 2).

The nasal cavity is separated from the mouth by a rather thick wall, but in the posterior inferior part of the cavity there is a slight depression extending downward toward the mouth (Plate I, 5).

Turtle.—The olfactory organ in the turtle consists of two symmetrical cavities separated from each other by a thick septum.

PLATE III.

B. Transverse section through both nasal fossæ of a turtle, looking anteriorly.

1. Anterior naris.
2. Jacobson's organ.
5. Mouth.
9. Septum.

The respiratory part of each nasal fossa is a tube-like structure extending downward and backward and opening into the anterior part of the mouth (Plate II, Figure A, 1 and 4). The olfactory region is a spherical chamber situated above the respiratory region, with which it communicates by an oval opening in its floor. (Plate II and IV, Figures A and D, 3). Projecting into each fossa, from the lateral walls, there are two prominences (Plate II and IV, Figures A, C and D, 11) which correspond to the turbinals in higher forms. These prominences form the an-

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terior and inferior boundaries of the olfactory region. The anterior prominence extends downward across the nasal fossa and unites with the septum, thus partially subdividing the respiratory region into an anterior and posterior portion.

Duck.—The nasal fossæ in the duck are two symmetrical cavities which communicate with each other at their anterior and posterior extremities, the septum being incomplete at these points.

PLATE IV.

C and D. Transverse sections through both nasal fossæ of a turtle, looking posteriorly.

1. Anterior naris.
2. Jacobson's organ.
3. Olfactory chambers.
5. Mouth.
9. Septum.
10. Partition between the nasal fossa and Jacobson's organ (Figure C). In the right fossa, this partition has been cut away.
11. Turbinals.

The maxillary turbinal is shaped like an inverted T, attached to the roof of the nasal chamber, and is suggestive of the turbinal with a double coil ϑ seen in higher form of vertebrates (Plate VI, Figures A, B and C, 1).

There are two ethmoidal turbinals. The anterior inferior one (Plate VI, Figures A, E, F and G, 2) is a double coil of which

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the superior coil curves upward, describing nearly a complete circle; the inferior coil is scroll-shaped, making two turns within itself (Plate VI, Fig. G, 2).

The superior ethmoidal turbinal is a simple structure (Plate VI, Figs. A and G, 3), consisting of a rounded prominence from which two irregular processes extend downward into the nasal fossa.

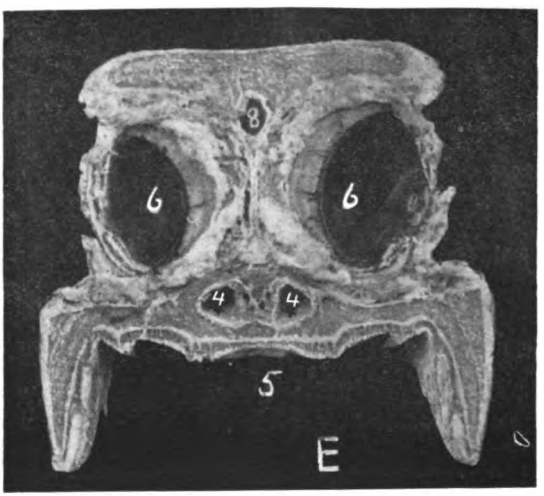

PLATE V.

E. Transverse section through the posterior part of both nasal fossæ of a turtle, looking posteriorly.

4. Posterior naris.
5. Mouth.
6. Orbits.
8. Brain cavity.

There are no accessory sinuses of the nose, but in addition to the numerous small air cells, the greater part of each superior maxillary bone is occupied by a large air cell (Plate VI, Figs. F and G, 10). These air cells, like the other pneumatic cells in the bird's skeleton, make the bones lighter in weight.

Dog.—The dog's nose is a very complicated structure. The maxillary turbinal is attached to the superior maxillary bone by a single shelf-like process which is much broader at its posterior than at its anterior end. From this process numerous curved

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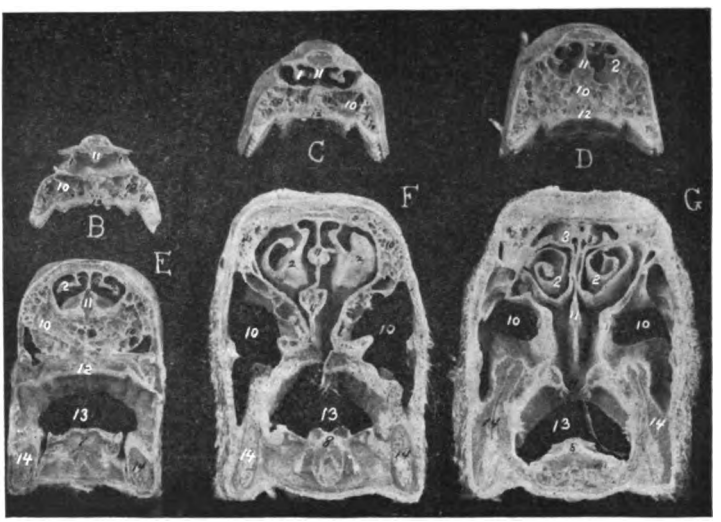

PLATE VI.

A. Longitudinal section through the right nasal fossa of a duck. B, C, D, E, F and G. Transverse sections through both nasal fossæ of a duck. B. Looking anteriorly. C, D, E, F and G. Looking posteriorly. In B, C and D, the inferior maxilla is not shown.

1. Maxillary turbinal.
2. Inferior ethmoidal turbinal.
3. Superior ethmoidal turbinal.
4. Posterior naris.
5. Eye.
6. Brain.
7. Tongue.

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8. Larynx.
9. Trachea.
10. Air cells in the bones.
11. Septum.
12. Roof of mouth.
13. Mouth.
14. Inferior maxilla.

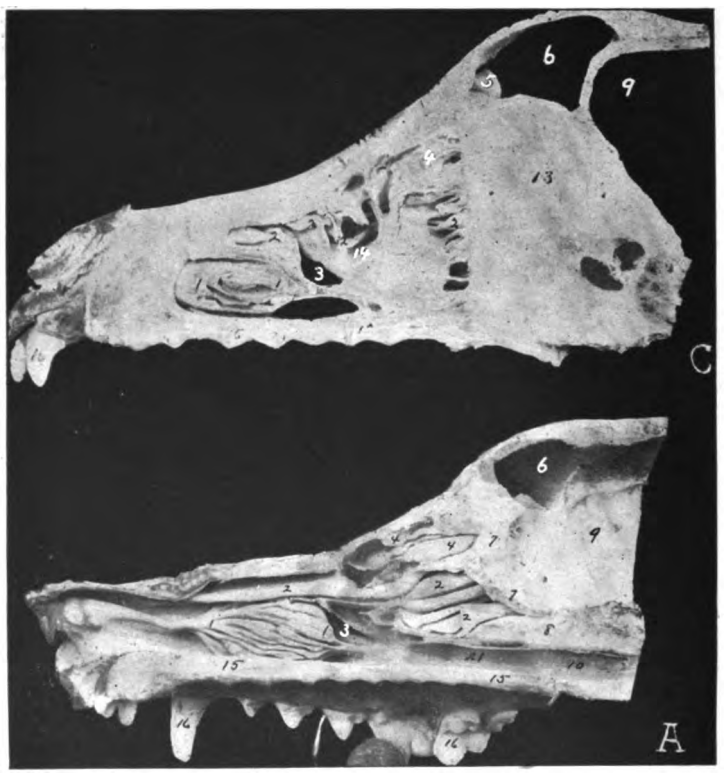

PLATE VII.

A. The right nasal fossa of a dog.

C. Section through the external third of the left fossa, looking toward the median line.

1. Maxillary turbinal.
2. Ethmoidal turbinal.
3. Ostium maxillare.
4. Ethmoidal turbinal in ethmoidal cells.
5. Ethmoidal turbinal in frontal sinuses.

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6. Frontal sinus.
7. Cribriform plate.
8. Ethmoidal turbinal in sphenoidal sinus.
9. Brain cavity.
10. Posterior naris.
11. Maxillary sinus.
12. Ethmoidal turbinal extending into the maxillary sinus and attached to its external lateral wall.
13. Orbit.
14. Hiatus semilunaris extending from the frontal and ethmoidal cells into the maxillary sinus.
15. Palate.
16. Teeth.
17. Vomer.
18. Lateral wings of vomer.
19. Septum.
20. Presphenoid.
21. Respiratory tract in the posterior inferior part of the naris.

branches are given off, which form an intricate labyrinth almost completely filling the anterior part of each nasal fossa (Plates VII, VIII and IX, Figures A, B, C, D and E, 1).

The ethmoidal turbinal is an exceedingly complex structure. It consists of a mass of thin, delicate scrolls of which at least five radiate from the convex surface of the cribriform plate. It articulates with and is supported by the sphenoidal, frontal, nasal and superior maxillary bones, and *some of its numerous branches extend into all the accessory cavities of the nose* (Plates VII, VIII, IX and X. Figures A, B, C, D, E, F, G and H, 2). One scroll extends forward over the maxillary turbinal, and anteriorly it is supported by *a process which is attached to the external lateral wall of the maxillary sinus* (Plates VII, VIII, IX and X. Figures B, C, D, F and G, 12).

The ethmoidal cells are cavities in the scrolls of the ethmoidal turbinals or cavities between the scrolls and the surrounding bones of the skull (Plates VII, VII, IX, X and XI. Figures B, C, D, H, I and K, 4).

The maxillary sinus is hollowed out of the superior maxillary bone and is only partially separated from the nasal fossa by the ethmoid bone (Plates VII, VIII, IX and X. Figures B, C, F and G, 11). The ostium maxillary is large and extends downward to the floor of the cavity, opening into the nasal fossa in the inferior meatus just posterior to the maxillary turbinal (Plates VII

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12. Ethmoidal turbinal extending into the maxillary sinus and attached to its external lateral wall.
13. Orbit.
14. Hiatus semilunaris extending from the frontal and ethmoidal cells into the maxillary sinus.
15. Palate.
16. Teeth.
17. Vomer.
18. Lateral wings of vomer.
19. Septum.
20. Presphenoid.
21. Respiratory tract in the posterior inferior part of the naris.

occupied by a double coil of the ethmoidal turbinal which is attached to the external wall of the sinus (Plates VII, VIII, X and XI, Figures A, B, C ,D, H, J and K, 5 and 6).

The sphenoidal sinuses (two in number) are separated from each other by a rather thick septum in the median line and *are nearly filled by scrolls of the ethmoidal turbinal* (Plate XI, Figures J and K, 8).

The posterior part of the vomer is expanded into two lateral wings which unite with the ethmoidal bone and thus divide the posterior part of each nasal fossa into two superimposed cavities (Plates VIII, IX and X. Figures D, F, G and H, 18). The superior cavity contains most of the ethmoidal turbinal and is distinctly an olfactory chamber. The inferior cavity is simply a tube-like structure forming a direct communication between the anterior half of the nasal fossa and the nasopharynx (Plates VII, VIII, IX and X. Figures A, D, F and G, 21).

The function of the accessory cavities of the nose in the dog seems to be to provide space for the tremendous development of the olfactory turbinals, to conduct air over the external surface of these structures and to furnish a system of drainage for them.

Monkey.—The olfactory organ in monkeys varies considerably in different species, but there are certain characteristics which are constant.

The maxillary turbinal is a comparatively simple structure and consists of a single or double coil. The superior coil is usually smaller than the inferior coil and is frequently only rudimentary or absent entirely. The turbinal is supported by the superior maxillary bone and its base forms a large part of the internal wall of the maxillary sinus.

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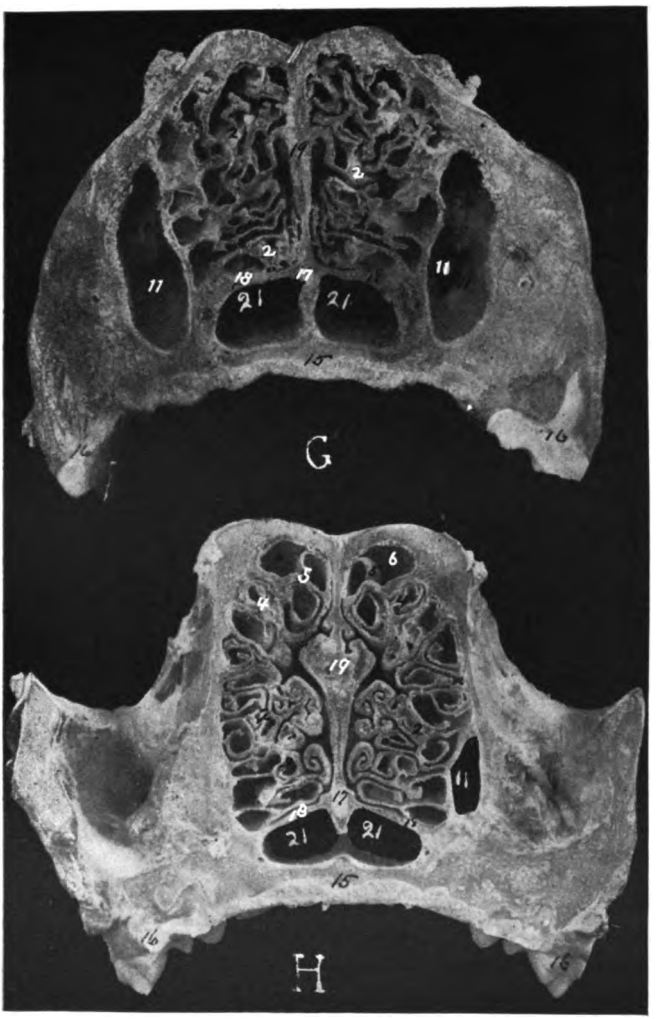

PLATE X.

Transverse sections through both nasal fossæ of the dog, cut slightly obliquely so as to pass through different parts of corresponding structures in each fossa, looking anteriorly. Text as in Plate IX.

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The ethmoidal turbinals vary in number from two to five and are situated above the maxillary turbinal. They are also comparatively simple structures. *In some species they extend into the posterior superior part of the maxillary sinus.* The maxillary sinus is always present and opens into the middle meatus. *On its outer wall there is a bony ridge, in some species slight, in others very prominent, which partially subdivides the sinus* (Plate XIII, 7). This ridge is, I think, a rudiment of the ethmoid turbinal and probably accounts for the bony partition frequently seen in the maxillary sinus of man.

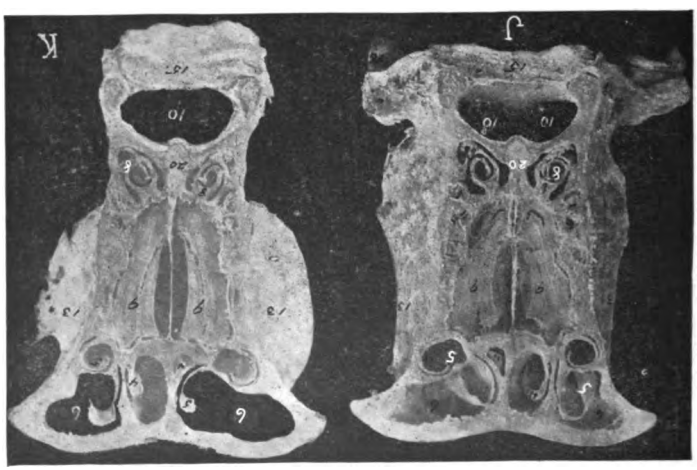

PLATE XI.

Transverse sections through both nasal fossæ of the dog, cut slightly obliquely so as to pass through different parts of corresponding structures in each fossa. J, looking anteriorly; K, posteriorly. Text as in Plate IX.

The ethmoidal cells vary greatly in size and number. In some species there are none, in some a single group opening into the middle or superior meatus, according to their location, and in others two groups, the anterior cells opening into the middle meatus and the posterior cells into the superior meatus (Plate XII, 3).

There are no frontal sinuses in most of the monkeys' skulls which I have examined, but the frontal bone in this region is composed of cancellous tissue, and in some of the higher orders of monkeys the most anterior ethmoidal cells extend up between the

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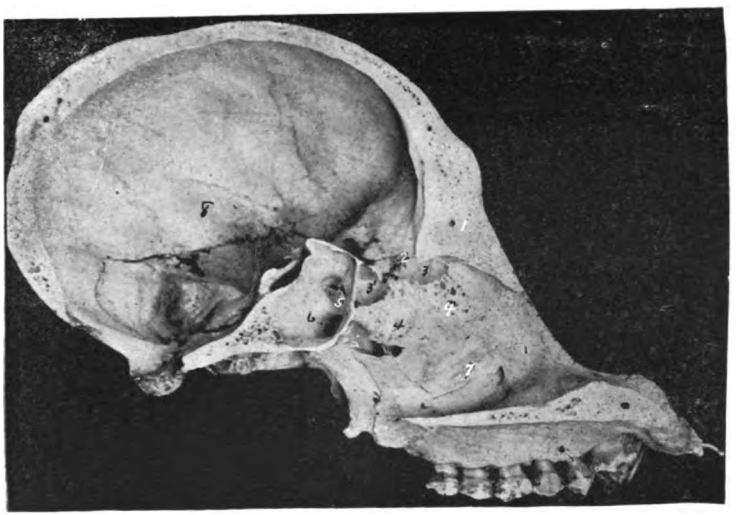

PLATE XII.

Orang-outang.

1. Frontal bone, cancellous.
2. Cribriform plate.
3. Anterior ethmoidal cell.
3.' Posterior ethmoidal cell.
4. Ethmoidal turbinal.
5. Ethmoidal turbinal extending into sphenoidal sinus.
6. Sphenoidal sinus.
7. Maxillary turbinal.
8. Brain cavity.

The turbinals are comparatively simple structures. The maxillary sinus is large and its walls are smooth, except the external lateral wall which presents a decided ridge extending upward to the ethmoidal bone.

The frontal bone is cancellous and there is no true frontal sinus but the anterior ethmoidal cell (3) extends up into the frontal bone.

The posterior end of the ethmoidal turbinal (5) extends into the sphenoidal sinus and divides it into two distinct cavities. The smaller, anterior cavity communicates with the superior meatus through the posterior ethmoidal cell (3'). The larger cavity (6) occupies the greater part of the sphenoidal bone and opens into the superior meatus under that part of the ethmoidal turbinal which extends into the sphenoidal sinus.

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two plates of the frontal bone (Plate XII, 1). In the chimpanzee there is a well-developed frontal sinus in each frontal bone with a thin bony septum in the median line. This sinus communicates directly with the anterior ethmoidal cell (Plate XIII, 1).

In those specimens in which there are no frontal sinuses and the ethmoidal cells are small or absent also, the orbits are situated very close together, and this juxtaposition of the orbits may ac-

PLATE XIII.

Chimpanzee.

1. Frontal sinus.
2. Cribriform plate.

3 and 4. Ethmoidal turbinal. The ostium of the middle ethmoidal cell is just below the figure 3, and the ostia of the sphenoidal and posterior ethmoidal cells are below the figure 4.

5. Superior sphenoidal sinus.
6. Inferior sphenoidal sinus.
7. Bony ridge on external lateral wall of maxillary sinus.
8. Brain cavity.

In this specimen the maxillary and the inferior part of the ethmoidal turbinal have been lost.

The frontal sinus is large and extends over the orbit; it drains into the anterior ethmoidal cell, which opens into the middle meatus.

The maxillary sinus is large and is partially sub-divided by a bony ridge extending upward and backward across its external lateral wall and roof, and uniting with the ethmoidal bone. This ridge increases in thickness as it ascends and gives off several lateral branches and corresponds to the ethmoidal turbinal which extends down into the maxillary sinus in the dog.

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count for the disappearance of the frontal and ethmoidal sinuses, these sinuses having been crowded out by the orbits.

The sphenoidal sinuses vary greatly. In those monkeys in which the turbinal structures are simple and rudimentary, the sphenoidal sinuses are small or have disappeared entirely, but where the turbinals are less rudimentary, one or more sphenoidal sinuses are present in each lateral half of the sphenoidal bone and some show distinct evidences of turbinals extending into them (Plates XII and XIII, 5 and 6).

Man.—The general characteristics of the nose and its accessory sinuses in man are too well known to need a detailed description here. There are, however, certain structures which occur frequently enough to be considered fairly constant, and are of importance when studied in relation to the development of the nose. A third ethmoidal turbinal, and more rarely a fourth one, may be present. These structures are evidently rudiments of the more extensive development of the ethmoidal turbinal in lower forms and, as is usual with such structures, they occur more frequently in the embryo than in the adult.

The maxillary sinus is sometimes partially divided into an anterior and posterior chamber by a bony partition extending across its floor (Plate XV, Figure B, 5) or up on its external lateral wall. Such partitions are, I think, rudiments of the ethmoidal turbinal which, in the dog, extends down into the maxillary sinus.

The frontal sinus sometimes communicates with an anterior ethmoidal cell (Plate XIV, Figure A, 1), or the posterior inferior part of the sinus is encroached upon by the ethmoidal cells, or there are two sinuses in one lateral half of the skull, or the frontal sinus is absent.

The sphenoidal sinus sometimes communicates with a posterior ethmoidal cell or the sinus is divided into two sinuses, one of which opens directly into the nasal fossa and the other into an ethmoidal cell, or both open into the superior meatus. (Plate XVII, Figure D, 6 and 7). These variations are all easily explainable, I think, when they are compared with similar structures in lower vertebrates and are probably reversions to more primitive types.

The variations in the frontal sinuses correspond with the structure of these sinuses, as seen in such animals as the dog and the monkey. The division of a sphenoidal sinus into two

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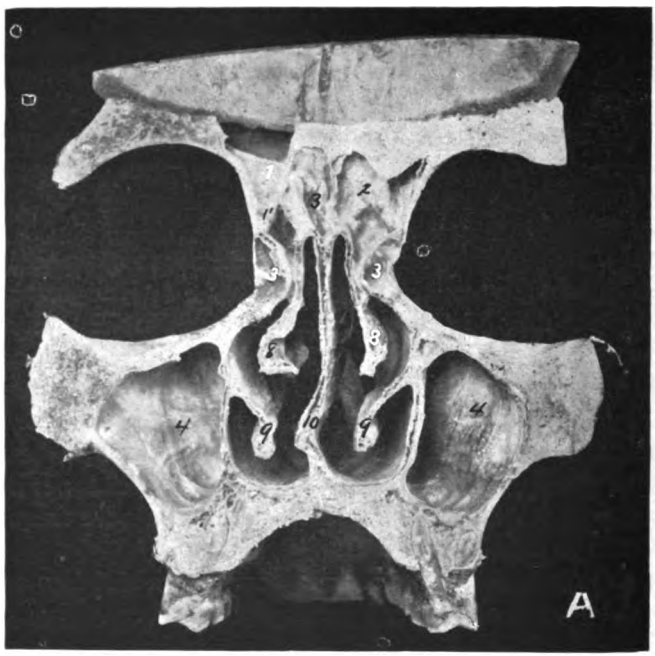

PLATE XIV.

Section through an adult human skull, looking anteriorly.

Text for this plate and the three following:

1. Frontal sinus, opening into a small ethmoidal cell 1', and thence into the middle meatus.
2. Large anterior ethmoidal cells extending upward into the frontal bone.
3. Ethmoidal cells.
4. Maxillary sinuses.
5. Bony partition in maxillary sinus.
6. Large ethmoidal cells extending into sphenoidal bone.
7. Sphenoidal sinuses. The ostiasphenoidalis are just below the figures.
8. Ethmoidal turbinals.
9. Maxillary turbinals.
10. Septum.

This skull shows several interesting rudimentary structures. The left frontal sinus (Plates XIV and XV, 1) communicates with the nasal fossa through an ethmoidal cell. There is no frontal sinus in the right half of the skull but the anterior ethmoidal cell on this side extends up into the frontal bone (Plates XIV and XV, 2).

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The left maxillary sinus is partially subdivided by a bony partition (Plate XV. 5) which corresponds to the partition usually present in the maxillary sinus of the monkey. One of the large ethmoidal cells contains a distinct turbinal scroll; unfortunately this scroll is in such a position that it does not appear in any of the photographs.

The left sphenoidal sinus is divided into a superior and inferior cavity by a thin bony partition (Plate XVII, 6 and 7). This partition is distinctly an ethmoidal structure and springs from the superior ethmoidal turbinal. Therefore, I have designated the superior cavity as an ethmoidal cell and also because its anterior part is entirely surrounded by the ethmoidal bone and its ostium is on the external side of the superior ethmoidal turbinal in common with other ethmoidal cells. This bony partition in the sphenoidal sinus corresponds to the extension of the ethmoidal turbinal into the sphenoidal sinus in the Orang-outang (Plate XII, 5).

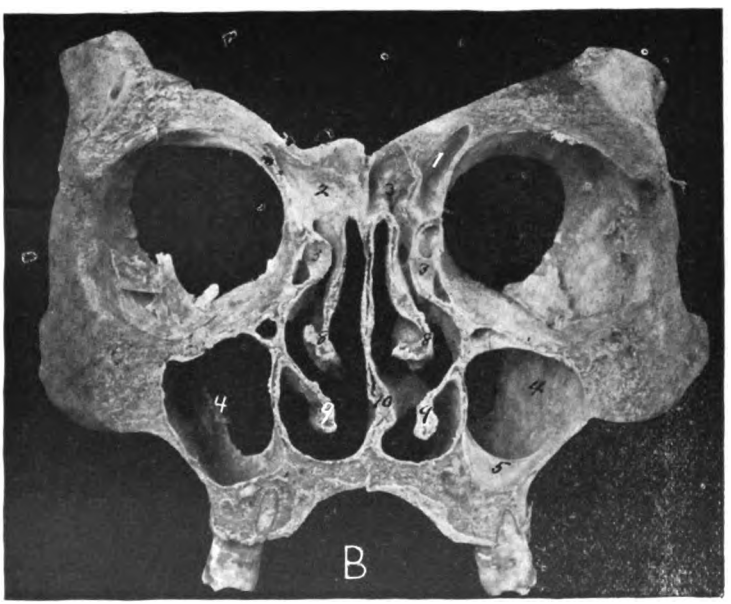

PLATE XV.

Section through the same skull, looking posteriorly. Text as in Plate XIV.

chambers is caused by a plate of the ethmoidal (or sphenoidal) turbinal extending across the sinus as it does in some monkeys.

Summarizing briefly, we find that the olfactory organ in fishes consists of two sac-like structures, each of which communicates with the exterior by two openings, but the nasal cavities do not

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communicate with the mouth. The turbinals are represented by prominences on the median wall. In dipnoi the nasal cavities open into the mouth and the nose then becomes a part of the respiratory system.

In reptiles the nasal cavities are subdivided into olfactory and respiratory regions, and the turbinal structures are more highly

PLATE XVI.

Section through the same skull looking anteriorly. Text as in Plate XIV.

developed. The secondary palate separates the posterior nares from the mouth, and the nasal fossæ are thus prolonged and open farther back into the nasopharynx.

In birds, the turbinal structures are all more complicated and the ethmoidal turbinals especially show a still higher degree of development.

In macrosmatic mammals (animals which have an acute sense of smell), the turbinal structures are exceedingly complicated scrolls forming intricate labyrinths which occupy the greater part of the nasal cavities. The accessory cavities of the nose all con-

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tain olfactory turbinals and are in intimate relation with these structures.

In microsmatic mammals (animals which do not have an acute sense of smell), the turbinals all show evidences of degeneration or reversion, and are comparatively simple structures. The accessory cavities contain little or no true turbinal tissue and their functional activity is lost.

It seems probable therefore that in man the accessory cavities of the nose are rudimentary structures.

PLATE XVII.

Section through the same skull looking anteriorly. Text as in Plate XIV.

The foregoing statements are based upon the study of the nose in fishes, frogs, alligators, turtles, birds, dogs, cats, wolves, foxes, bears, beavers, seals, rabbits, guinea pigs, lions, deer, sheep, cows, pigs, buffaloes, horses, elephants, monkeys and man.

I wish to thank Dr. Wm. T. Howard and Dr. L. W. Ladd for the facilities which they have given me for carrying on this work in their laboratories, Dr. R. G. Perkins and Dr. W. B. Chamberlin for doing the photographic work, Dr. C. A. Hamman and the Smithsonian Institute for loaning me material for study.

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REMARKS ON SOME ABUSES IN THE INTRANASAL SURGERY OF TO-DAY.

BY JOHN N. MACKENZIE, M.D.

At the meeting of the British Medical Association, held in the city of Montreal in September, 1897, during the discussion of certain ultra-radical methods of intra-nasal operative procedure advocated by some of my English colleagues, I took occasion to protest in somewhat vigorous terms against the then indiscriminate and thoughtless employment of surgical measures within the nasal passages and the appalling and useless sacrifice of tissue and function which many of them entailed. While sounding a note of warning against certain methods which were surely destined to bring the modern surgery of this region into disrepute, I at the same time emphasized and deplored the fact that the sudden craze for operation that had developed across the seas had caught its inspiration and derived its leadership from this side of the Atlantic; and in response to the expression of surprise on the part of some of the members who had taken part in the debate, that more serious consequences had not followed in its wake, I ventured to express the opinion (speaking with all reverence) that, in the absence of other and adequate explanation of the phenomenon, the apparent infrequency of accident and fatality following the reckless use of knife and chisel was due to the operation of that mysterious force in nature which is known as the Grace of God.

I do not think that the members of this Association can accuse me of irresolute timidity or lack of the proper conception of the importance of radical procedures, when necessary, in the surgery of the upper air tract. In dealing with conditions that demand surgical attention I believe in the gospel of thoroughness. It is not therefore against the legitimate surgical measures employed in the nasal passages that I wish to speak, but against their abuse. The practices which I deprecated in 1897 persist, and persist in an aggravated form, to-day to the serious injury of our specialty in the eyes of conservative men, and it is, therefore, against the reckless and indiscriminate performance of surgical

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procedures in the nasal and accessory cavities that I wish once more to enter a formal protest.

In doing so, I shall not go into an elaborate bill of particulars, but simply indicate very briefly the structures that have suffered most in the frantic rush for operation, prefacing my remarks with the statement that they are intended for a well-known class of operators that are found everywhere, and are therefore not common to any community.

Burke's dictum, that you cannot indict a whole nation, is equally applicable to laryngologists the world over, and it is therefore manifestly unfair to hold the body politic of laryngology in any community responsible for the surgical antics of the fools who rush in where angels fear to tread. These latter gentry—the product of no particular land—are the ones who do the most injury. They clear out the nasal passages as if they were opening up a primeval forest. They saw and chisel and burrow through everything in sight, never forgetting to apply in this particular field the injunction of the Irishman at Donnybrook: "If you see a head, hit it."

Everywhere, in matters relating to intra-nasal surgery, there will, in the nature of things, always be honest difference of opinion. In a question of this kind it is difficult to eliminate the personal equation. From the wild enthusiast (who is by no means always the young and inexperienced) who sees an indication for operation in the slightest want of absolute symmetry or in the least departure from the perfect image as seen in diagrams and anatomical plates, to the surgical nihilist, who, either through ignorance or timidity, or both combined, hesitates to grapple with the responsibilities of the situation—each will have his say in monotonous and perpetual controversy until the end of time.

In the therapeutics of the nasal and accessory cavities the most brilliant advances and results have been achieved in the domain of surgery. Indeed, it may be laid down as a general proposition that success in the treatment of nasal disease largely depends, other things being equal, on the amount of legitimate surgery in the case. Our surgical cases are, as a rule, our most successful and therefore our most satisfactory cases.

With these preliminary observations, let me proceed at once to the discussion of the subject proper of my remarks.

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THE NASAL SEPTUM.

Perhaps the most vigorously assailed of all the intranasal structures is the septum. No organ in the body, not even the uterus, has been subjected to more unnecessary assault. I am speaking within the limits of the strictest conservatism when I say that fully two-thirds of all operations on the septum (including, of course, those done by all classes of operators) are operations unnecessarily performed. The nasal septum is the surgical objective of every beginner in laryngology, and the "sawing out of a septal spur" is usually his first baptism of blood. The tyro, when uncertain what to do, seemingly takes as his rule of practice the paraphrase of an ancient law of whist, in case of doubt, smash the septum. What matters it if nature has decreed that asymmetry of the anterior nasal passages in the adult should be the rule? Every bulge, every irregularity of the cartilage or bone, every spur, to the amateur is legitimate prey.

Unless the irregularity be of such a character as to cause serious obstruction and thereby cripple function, most of the spurs met with are perfectly harmless. Small spurs, especially those projecting into the inferior meatus, by acting as protective barriers against the entrance of foreign matter, may be actually productive of good to the individual. Thousands of people go through life in perfect health and comfort with large spurs of the septum, which, fortunately for their possessors, have remained undiscovered. Even when such deformities come in contact with opposing surfaces, the mere fact of such contact should not necessarily constitute an indication for surgical treatment. In this latter case much harm has been done by the pernicious doctrine of so-called "pressure contact." Acording to this luminous conception, when the apex of a spur impinges upon the opposing turbinated body, there is immediately set in motion a train of symptoms (too numerous to mention) of which hypertrophy of the opposing structure and interference with "nasal drainage" are among the most conspicuous. Hypertrophy from what? Now as to deflections, dislocations and deformities of the septum other than distinctly localized projections or spurs. The operation to be performed will depend upon the nature of the deformity. No single method is applicable to all cases, and it will sometimes be necessary to resort to several different procedures

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in individual cases before the deformity is overcome. In this particular field we find the greatest divergence of opinion as to what is best to be done. Nearly every rhinologist has his pet operation, known, or not known, by his name—some more or less ingenious and original in design—others masquerading in the guise of novelty and originality, but in reality as old in principle as the art of surgery itself. Even a partial list of the operations performed on the septum would rival in length the catalogue of the ships in the Iliad or the genealogical records of Deuteronomy. Many of these, though correct and ingenious in principle, are far from satisfactory in practice. Some are unnecessarily complicated, others require a ridiculous number of instruments for their completion. In not a few instances of "successful" performances of some of them, the patient is in a much more serious plight than he was before the work on him commenced. When, as is not infrequently the case, long-continued, disagreeable after-effects follow the establishment of a "cure," I am forcibly reminded of the Irishman's definition of the grip—that it is a disease in which you are six months sick after you have gotten well.

A great deal of time and trouble, in many cases, may be saved both as regards the treatment of the septum itself and also the after-treatment—the subsequent management of the case—in operating by a method the principle and practice of which was advocated and practiced by me many years ago,[1] viz.: the removal of portions of the external wall, and notably the inferior turbinated bone of the obstructed side (or portions thereof) as a substitute in suitable cases, for operation upon the septum itself.

Since my original article was published, I have received several communications from various laryngologists in this country, notably from the late Dr. Jarvis, of New York, in which they have claimed that the principle had not only given them great satisfaction, but had also extricated them on more than one occasion from great difficulty and embarrassment. The method is applicable in cases in which sufficient reason exists for not operating on the septum. Its principle may also be extended in its application to other surgical procedures within the nasal passages.

[1]On removal of the inferior turbinated body of the obstructed side as a substitute for operation on the delected septum in certain cases. *New England Medical Monthly*, 1884. 5 IV., p. 249.

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The crying need in operation on the septum is greater simplicity of performance. With a comparatively-speaking small armamentarium, backed by a *quantum sufficiat* of good, common surgical horse sense, the surgery of the septum is not a complicated problem, but one which can be worked out with comparative simplicity and satisfaction. Not to multiply illustrations, what a variety of work, for example, and what delicate work can be successfully done without accident, without interruption of the duties of the individual and without disagreeable after results by the simple means of the surgical drill in its various forms?

THE TURBINATED BONES AND BODIES.

Another wholly indefensible practice in the intra-nasal surgery of to-day is the wholesale removal of the turbinated bodies and bones. With some this seems to be a well-recognized routine method of practice, and special apparatus have been devised for the purpose, which go under the euphonious and appropriate names of "spoke-shaves," "plows," and the like.

In dealing with obstruction or disease of any kind in the inferior meatus, the physiological fact should be forever borne in mind that, while all portions of the nasal and accessory cavities are thoroughly supplied with air in the act of respiration, the main currents do not stream through the inferior meatus, but pass in a curvilinear path through the region of the middle meatus. Considerable obstruction therefore may exist in the inferior meatus and yet respiration go on normally and with perfect ease. Hence mere obstruction or blocking of this channel, as some would have us believe, by no means negatives the idea of perfect physiological discharge of function on the part of the nasal passages. This is not only theoretically but clinically true. The fact also must not be lost sight of that, apart from its other and varied functions, the inferior turbinated body is the richest of all the intranasal structures in that curious erectile body that plays such a manifest and manifold destiny in the physiology of the organism. The removal or destruction of this important area cannot fail to be followed by deleterious consequences, and to the absolute truth of this statement the dry, secretionless, crust-laden nasal passages of the victims of too much strenuous surgery often bear eloquent and silent witness.

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No one questions the frequent necessity of the complete or incomplete sacrifice of the middle turbinate bone, notably in the case of accessory sinus suppuration and the radical cure of tumors of the nasal and accessory cavities, and, in occasional cases, as a substitute for operation on the septum. But to make it responsible for a host of woes unnumbered, and to attack it surgically from a purely theoretical standpoint, is vicious both in principle and practice. Especially preposterous is its removal for the alleged cure of the disease falsely called hay fever. In dealing with this structure, it should always be remembered that its anterior end is one of the chief buttresses against the admission of foreign matter to the air passages—the principal point at which filtration of the external air takes place. It should, therefore, not be assailed on indifferent and insufficient pretext, or sacrificed on the altar of fantastic hypothesis.

THE ACCESSORY CAVITIES.

No one will dispute the fact that these cavities are often unnecessarily entered, and sometimes with harmful results. Especially is this true in the case of the antrum and frontal sinus. The sheltered position and comparative inaccessibility of the sphenoidal sinus have been a godsend to that cavity when the amateur operator has been abroad.

The cavity that has, however, suffered most at the hands of the incautious operator is the antrum. It is certainly curious, to say the least, how some operators can have seen so many cases of antral suppuration. The condition is common enough, to be sure, and examination after death reveals the fact that it is more common than would appear from purely clinical experience; but its relative frequency as compared with other diseases in the experience of some practitioners is well-nigh past all understanding.

How often these cavities have been carelessly punctured or opened will never be known. Such cases do not find their way into print.

Granting that our methods of diagnosis in antral suppuration are still defective, and that it is often impossible to establish with positiveness the existence of the disease except by exploratory puncture (a procedure itself not infallible), it nevertheless behooves us even in such a simple matter, especially in acute cases,

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to exercise at least a little caution in such a seemingly simple matter as the puncture of the antral wall. It is a great mistake to assume that the detection of antral suppuration cannot be positively determined without exploratory puncture. In many cases there is not only presumptive, but actual, evidence of the existence of pus without the aid of needle, drill or trephine. It is a good rule to follow to attempt in the first instance to make the diagnosis without exploratory puncture, and should the latter be necessary, as it undoubtedly is in a large proportion of cases, to be ready in the event of the discovery of pus, to proceed at once to operation, thoroughly cleansing and disinfecting the cavity after its contents have been removed. It is such an easy matter to thrust an instrument through the antral wall that it has become with some a routine practice to resort at once to that procedure in all cases of suspected antral suppuration.

While in nine hundred and ninety-nine cases out of a thousand it is perfectly harmless and safe, yet it sometimes happens (in solitary exceptional cases, it is true) that matters of grave import ensue. This happened, for example, in the dispensary of one of our large hospitals in a case in which incautious and repeated attempts at exploration of the antrum were made. No pus was found, but the patient developed a septic empyema of that cavity, which resulted in general septicemia and death. In this case the fault lay, doubtless, in an infected instrument and individual carelessness; but it should be remembered that such accidents are not impossible when there is not the strictest adherence to antiseptic rules.

How often has the frontal sinus been opened to find little or nothing pathological in its interior is a question that never will be answered. Even the ethmoid does not always escape. A short while ago I was consulted by a young man from the south to have his ethmoid removed for the cure of chronic bronchitis and asthma. He had consulted a leading surgeon laryngologist in one of our largest northern cities, who had informed him that his ethmoid was badly diseased in both nostrils, and proposed attacking that organ from without through the antrum. On careful examination of his case, I found a few sonorous and sibilant râles scattered throughout the chest, and a bad chronic catarrh of the nasal passages and pharynx with the profuse thick mucopurulent secretion which is characteristic of that con-

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dition. The sinuses were healthy and, after prolonged search, I could find nothing whatever abnormal about the ethmoid. Here, then, was a case in which a well-known surgeon proposed to go through a healthy antrum to remove an ethmoid which was not diseased.

If, now, we cast about for the cause or causes of this anomalous condition of affairs, we will, unfortunately, not have very far to go. Reduced to its simplest terms, the basic cause of the reckless intranasal surgery that is seen to-day is ignorance—an ignorance begotten of a lack of the proper preparatory general education which is an absolute preliminary necessity to the proper conception and practice of any special branch of medical knowledge, and the careless way in which, in many quarters, laryngology is both studied and taught.

I was once consulted by a physician who had just been appointed laryngologist and instructor in laryngology in a hospital and post-graduate school in a distant city of the Union. He came to me with the confession that, although he was supposed to be qualified for the position, he, nevertheless, was practically ignorant of what was expected of him, and that he had therefore come to me to take a special course of study which would equip him for the work before him. Out of curiosity, I asked him how much time he proposed to give to special study. He said he thought he could cover the ground in six weeks. When I had recovered from the shock to my respiratory centre administered by his reply and had told him that, after graduation, I had had a two-years' service in the medical and surgical wards of a large general hospital, during which time I had incidentally familiarized myself with laryngological technique; that I had subsequently spent over two years abroad in the completion of my special studies, and that finally I had spent still another year at work in other special departments of medicine before I considered myself thoroughly equipped to go before the public as a practitioner of laryngology, I never shall forget the expression of his face. He was polite enough not to give vocal expression to the emotions which stirred his soul, but he left me firmly convinced, I am sure, that anyone who would require so much time for the completion of his special studies must be the most unreceptive ignoramus and the most stupendous colossus of stupidity of either ancient or modern times.

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I know of another instance in which a man doing general practice was suddenly promoted to a professorship of laryngology in a large medical school who, at the time of his appointment, was actually not only unacquainted with the ordinary technique of a laryngological examination, but was also ignorant of the names and uses of the instruments employed in the surgery of the nose and throat. He attended a six or eight weeks' course in a post-graduate institution, at the expiration of which time he took his seat in the faculty of the college as clinical professor of laryngology.

These cases may be isolated and exaggerated, but the very fact of the possibility of their existence is in itself appalling and calamitous.

This brings us to the consideration of the particular type of laryngologist to whom these remarks are chiefly addressed. Let us glance for a moment at the manner of his evolution. He graduates from an institution at which he has received a fairly good, bad or indifferent medical training. He decides at once to take up a special study. He may start out with or without any preliminary training or knowledge. The field of laryngology is alluring, and he immediately repairs to a post-graduate school or a teaching hospital; or it may be, instead of attending either he decides to follow the practice of some operator whose chief, and often only, patent of authority consists in his having performed a certain operation a fabulous number of times. He takes a "course" of a few weeks' duration. It is always an "operative" course. Life is too short to pass the time in such frivolous pastime as the technique of examination or the art of diagnosis—to fritter away the golden hours in the study of the commoner diseases of the climate which are in the future to constitute the bulk of his practice. His mind is set on higher things. He expects the course to be started with some such surgical procedure as extirpation of the larynx or curettement of the sphenoidal sinus. Operations such as these should constitute, in his judgment, the principia of his special education. He is surfeited with operations. At the same time, he quickly absorbs from teacher and text-book graphic descriptions of methods mapped out with mathematical precision and in seductive diagram on paper or on the blackboard, but which he learns in his later experience do not always pan out successfully on bone and cartilage. Why should

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he not attempt these procedures so artistic in design and, according to the accompanying narrative, so uniformly certain of the best results? Why should he restrict the theatre of his performances, when he is assured by teacher and text-book that in the bright lexicon of promise reserved for the amateur operative laryngologist there is no such word as fail? He sees difficult operations performed a score of times by a master hand, guided by special skill and the light of long experience. Why should he not proceed at once to attempt the same? All that he needs is the necessary apparatus. He is a perfect gold mine to the instrument maker. He returns home with a trunkful of all kinds of instruments for the removal or destruction of each and every portion of the respiratory tract, and with a head hot for their immediate use. He knows it all. He must establish his reputation by some spectacular surgical achievement. His motto and golden rule is the martial maxim of Danton, "L'audace, encore l'audace toujours l'audace." He therefore does not hesitate to do a window resection of the septum for the cure of a cough, which subsequent examination may show to be due to pulmonary tuberculosis, or to remove the middle turbinated bone for any miscellaneous group of symptoms with which the patient may be affected.

In one of John Hare's exquisite little plays that charming actor is interrupted in his character sketches by his leading artist with the observation, "I know that man. He lives in Sheffield." All of you know the man I have just described. He too, perhaps, lives in Sheffield; but he also lives in London and in Paris and in Berlin and in New York. He also lives in Baltimore.

Another influence unfortunately on the increase which has brought the practice of intranasal surgery into disrepute is the performance of the minor operations on the nasal passage by the practitioner at large, who has acquired a smattering of the subject, usually chiefly from the perusal of text-books and attendance on a few dispensary clinics. While it goes without saying that any capable man may, by devoting special attention to the subject, acquire a sufficient amount of manual dexterity to do the ordinary operations on the nose—the fact that he does general practice, of course, is not incompatible with the possibility of their successful performance—still it is a notorious fact that such is not usually the case, and it may be safely said that nine-tenths of the

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general workers who practice intra-nasal surgery are not qualified for the work, and in their disastrous attempts to go beyond their ken is found a most conspicuous illustration of the adage that a little knowledge is a dangerous thing. Instances of this sort may be multiplied indefinitely. One illustration will alone suffice.

There is an impression widely prevalent among mankind that almost anyone can edit a newspaper or manage a hotel. Almost coextensive with this belief among the medical profession is the conviction that every general practitioner of medicine is thoroughly qualified to remove the hypertrophied lymphoid tissue in the nasal pharynx—the falsely-called "adenoid" growths of childhood and later life.

In the hands of the expert, with proper instruments and technique, the operation for their removal is simple, safe and in ordinary cases, such as the soft lymphomata usually met with, easily performed; and when completely and carefully done, there is no operation more satisfactory, not only in its immediate, but also remote results. But I need not remind you that there are abundant instances in which its removal is not so simple a matter, and often considerable skill is necessary to complete success.

These growths should be removed without complications or evil results. Personally, I have not met with any serious accident, beyond a few cases of alarming hemorrhage, in their extirpation, a record which I attribute largely to the fact that I always use the forceps to the exclusion of all other instruments, except in cases in which the density and other peculiarities of structure call for other modes of instrumentation. But abundant evidence exists of accident, and even fatality, following attempts at their removal, and even in the practice of those of large experience. If results of serious import follow this operation by the skillful workman, how much more likely are they to occur at the hands of the amateur who is not trained for the work? For, although a divine Providence seemingly assists at most operations of the kind, if statistics could be compiled of all the operations done by this latter class of operators and the ultimate results brought to light, the amount of damage done would appear in the form of a revelation. It is the old, old story, as in other parts of the body, of a simple surgical procedure brought into disrepute by indiscriminate and careless performance. Although the opera-

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tion is in itself a simple one and in the majority of instances easily carried out, I know of few operations commonly performed in the air passages that are more easily badly done.

Let me not be misunderstood. In the narrow limits to which I have confined these remarks, it has not been my object to decry in the least degree the many excellent measures which modern ingenuity has devised for the surgical treatment of intra-nasal affections. No one resorts to them with more alacrity than myself when the necessity for their adoption is apparent. It is not my object to stir up strife, to impute unworthy motives to anyone, or to arrogate to myself any superior wisdom in the surgical management of these diseases. Nor do I wish to shift to other shoulders all the blame. I, too, in my earlier days, have fallen by the way. Indeed, it was once facetiously said that the street in front of my office was paved with the turbinated bones of my victims.

All I desire to do is to outline as briefly as possible certain abuses which have gradually crept into the practice of our art, and which, unchecked, are sure to redound to its certain and enduring disadvantage.

The amount of reckless surgery done in the nasal passages will never be known or chronicled in the pages of medical literature, but it can be found in its abiding-place in the book of the recording angel. It is high time for us to clarify the atmosphere of our ideas on this subject and for authority to call a halt. We, who are teachers of laryngology, should wake up to the responsibilities of our position and see to it that our pupils shall not leave our institutions or post-graduate schools until they shall be taught on the one hand, conservatism and moderation in the surgical treatment of the simpler affections of the upper air tract, and on the other hand, a fearless thoroughness and completeness when brought into the presence of situations of graver emergency. The problem, though difficult, is not impossible of solution. The cure for the evils I have been discussing is largely educational. All of us are liable to error, even the youngest of us. While impressing upon our students the absolute necessity for surgical measures in proper cases, we should at the same time make the dangers of their indiscriminate performance fully apparent. In this way only can we be reasonably sure of accomplishing the desired result. The error of first impression

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derived from teacher and text-book is often difficult of eradication. In the lecture room, in the clinic, in our daily walks with the student, let us make that first impression a good one.

The time has come for the higher education of the student of laryngology. I have given at length in my chairman's address at the meeting of the American Medical Association in 1901[1] an outline of what should constitute the study of laryngology in the university and in the higher medical education. With such a preliminary training the student is in a position to take up his life work in earnest. When the laryngologist is not made and turned out in a few weeks or months, when he approaches his special studies after a broad and liberal medical education, when he views his subject from a loftier standpoint and in the light of high ideals, then we shall see the passing of the fraternity of carpenters who have brought discredit on our specialty and a well-ordered intranasal surgery will not only take its commanding and rightful place in the estimation of the medical profession, but will also be a great and enduring blessing to the public at large.

Discussion.

Dr. EMIL MAYER said that reckless or unnecessary surgery does not only apply to laryngology, but to every branch of surgery. It had often occurred to him that, while in matters of law there was a Supreme Court, to whose decision both lawyers and layman yielded as final, there was no constituted body in medicine similar to that officially known as a court of last resort. Perhaps it happens that operations are advised from motives of cupidity, but we have reason to believe that such dishonesty is rare. Honest differences of opinion may arise, as for instance, in the much-discussed "malignant diseases of the larynx," when one operator advises endolaryngeal operation, another thyrotomy, and still another complete removal of the larynx and neighboring glands. In such cases of severe malignant disease the utmost frankness should prevail, the severity of the conditions pointed out, the dangers and ultimate results of the operation placed before the patient and the patient's friends. Ofttimes the laryngologist will, for very good reasons, advise delay in operating, as in an instance known to the speaker of a child who had adenoid vegetations, which the attending laryngologist fully recognized to require removal, but advised some delay because of the child's poor physical condition at the time.

[1]The Study of Laryngology in the University and in the Higher Medical Education. *Journal of the American Medical Association,* July, 1901.

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A few days later, while in a distant city, another laryngologist was consulted, who urged immediate operation, which was consented to. The motives prompting the latter looked rather peculiar, to say the least.

There are still some who are strong and firm enough not to do anything other than that which is to the best interest of the patient, and to these men must come a sense of satisfaction in having done the very best that is humanly possible, even though an unexpectedly serious result should follow some operation.

Dr. J. H. BRYAN considered the paper of Dr. Mackenzie most pertinent and interesting. It set forth a condition of affairs which prevails not only here but abroad, and which certainly should be recognized; and something should be done to prevent such terrible results to the nasal passages. He believed, however, that the conservative pendulum has swung too far in the opposite direction. No doubt much harm has been done in reckless surgery on the nasal passages, but there is no justification for the assault on American laryngology published in a recent number of the *Journal of Laryngology*. There are, of course, quacks in this country, but in proportion to the population, Dr. Bryan did not believe they are in greater numbers here than in the British Isles or on the Continent, and he could see no reason why articles by irresponsible men should be taken as representing the views of responsible American laryngologists. It is not necessary to remove every spur nor to correct every deflected septum, but it is necessary to do these operations when these pathological conditions cause trouble, such as interference with sinus drainage or middle ear ventilation. The operations are not always successful, as all can testify, but when they are, they certainly give the patients much relief.

Dr. W. K. SIMPSON thought Dr. Mackenzie had possibly gone a little too far in his warning, for he believed that there was as much harm in over-conservatism as in its opposite. He thought it was the experience of all who had cases sent to them for consultation to see the results of over-conservatism, of waiting, depending either on ignorance or other causes. The most important point in this connection was the attempt on the part of the general practitioner sometimes to undertake operations on the nose and throat when not qualified for the work. This was where a great many mistakes occurred and where a great deal of poor work was done. Patients thus handled were often the ones who came to the specialist for correction. Dr. Simpson felt sure, however, that Dr. Mackenzie's paper would do much good.

Dr. D. BRYSON DELAVAN appreciated Dr. Mackenzie's desire to inspire a better understanding and knowledge on the part of practitioners in general regarding these topics. Dr. Delavan had been especially interested in the remarks upon the treatment of the various diseases, and in particular that of acute sinus disease.

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During the past winter he had not been obliged to operate more than twice in cases of supposed acute frontal sinus disease, because under prompt, early and carefully-carried-out treatment in nearly every instance these cases resulted favorably and radical operations were not necessary. He has, however, seen several cases of frontal sinus disease operated upon within the last two years which have surprised him. He referred to two of these especially. Both patients gave signs of chronic suppurative disease of the frontal sinus, and both cases were attended with disease of the ethmoid cells. In one there was also disease of the antrum; in the other there was not. Operation was performed and, instead of finding the frontal cavity filled with pus, what appeared to be perfectly normal, healthy mucous membrane was found lining the frontal cells. Dr. Delavan desired to know if this had occurred in the experience of other members of the Association.

With regard to another question he stated that, several years since, he read a paper before the British Laryngological and Rhinological Association on "The Ultimate results of Extensive Operations upon the Cavities Adjacent to the Nose," the object of the paper being to excite discussion and raise the question as to what eventually happened to the patients so operated upon. He had never received a satisfactory answer, but believed that, inasmuch as these operations are so commonly performed and the patients so often disappear from view, the results are good, even the very extensive operations seeming to relieve the patient from the necessity of all further serious treatment after recovery has actually taken place. Of course, there were notable exceptions to this where the services of the highest skilled specialist were required for long periods after the first operation.

With regard to pressure contact, he could hardly accept Dr. Mackenzie's statement. Speaking of operations upon the septum, Dr. Delavan had recently a case in which the septum was operated upon by a surgeon who did not understand the Asch method. The hard rubber nasal splint had been left in situ, without removal for cleansing, for a number of days. The result had been an extensive destruction of the septum, with a slight falling in of the nose. He had lately brought from Paris an invention supposed to be an improvement upon the Asch method. The objection of the inventor to the Asch instrument was that, "if left continuously in the nose, it could not be kept clean." An "aseptic" instrument had therefore been devised, with the intention of allowing it to remain in the nose without removal throughout the whole period of treatment. The speaker exhibited this instrument to illustrate the lack of understanding which prevailed with regard to the Asch operation, and he instanced a case which he had seen in this country where an operator had ignorantly allowed the Asch tube to remain in the nose without removal for

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cleansing throughout the whole period of treatment. The result was an extensive perforation of the septum, with falling in of the tip of the nose. The speaker believed that the principles of treatment laid down by Dr. Asch could hardly be improved upon.

Dr. Delavan wished to put in a claim for priority with regard to operations upon the turbinated bodies themselves, and called the Association's attention to his article entitled "On the Question of Hypertrophy of the Osseous Structure of the Turbinated Bodies Practically Considered," read before this Association in 1882, and published in its Transactions. In this article he had demonstrated that in cases of deviation of the nasal septum complicated with enlargement of the middle turbinated body upon the concave side of the septum the turbinated enlargement should first be reduced preliminary to the straightening of the septum.

Dr. CLARENCE C. RICE felt that there never was a time when there were so many unnecessary operations on the nasal sinuses as at the present. He heard constantly of radical cutting into the sinuses for the alleviation of such indefinite symptoms as headache and neuralgic pains. He felt that acute inflammatory attacks of the sinuses very rarely required radical operation, as they could be controlled by judicious constitutional treatment and proper local remedies. He agreed with Dr. Delavan that radical operation seldom, if ever, benefited such cases as those reported by the latter. He had seen many patients who had suffered far more after radical operation upon the sinuses than before. They had suffered from vertigo, headaches, intense dryness of the nose and throat, and had continued to be annoyed by offensive, purulent discharge. While he believed with Dr. Mackenzie that many of these operations were done by reason of ignorance, and with Dr. Mayer that the motive was often the fee which can be obtained, there was another reason which influenced especially the teacher at the clinics, and that was his desire to exhibit all forms of nasal operative work to the students in attendance. There were many would-be specialists, who came from the country with the sole desire of seeing operations on the antrum and ethmoid, and if they could not see the operations they wished at one medical school they would go to another. One student told the speaker that Dr. X.'s clinic was exceeding useful to him ,for he had witnessed at a single clinic four cases of total removal of the ethmoidal cells. This was vigorous competition for any clinical instructor to contend with. The serious aspect of all this was that non-conservative and ignorant operators did not select their cases for operation carefully, and that unnecessary and damaging work was constantly done.

Dr. SAMUEL JOHNSTON wished to mention in this connection a case which came to his clinic with a discharge from and obstruction of the nasal passages, especially on one side. The antrum had been opened, and other operations done upon the nose

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before she came to the hospital (all unnecessarily, as was subsequently shown). A diagnosis of gumma of the lower turbinated was made and, under anti-syphilitic treatment, all symptoms of nasal disease disappeared in a few weeks.

Dr. CORNELIUS G. COAKLEY had been much interested in the foregoing paper, and in the discussion referring to the accessory sinuses. He thought there was a good reason why some men have more of such work than others, since those who hunt for cases of chronic suppurative conditions of the sinuses find them more readily than those who are not always on the lookout for them. There was no question that many cases of chronic catarrh which come to the dispensaries and which are often seen even in private practice, have no disease of the accessory sinuses, and although maybe of long standing, are often cured without radical operative procedure. With reference to the first case referred to by Dr. Delavan, Dr. Coakley thought a very large percentage of acute cases occur in connection with the so-called acute rhinitis. If proper remedies are applied, it was believed that the mucous membrane of the sinus would be cured with the subsidence of the inflammatory process in the nose.

With regard to radical operations, 100 per cent. of cure cannot be claimed even in cases of operation on the mastoid, and secondary, or even tertiary, operations may occasionally be necessary. He knew of cases operated upon as many as five times, where the patient still had a slight discharge from the membrane. While realizing that operations in acute cases have often been followed by successful results, it was still believed that less radical measures might also have effected the cure.

Dr. THOMAS J. HARRIS spoke in commendation of Dr. Mackenzie's paper, considering it most timely. Regarding the necessity for operation, the question ultimately came back to the necessity of operations in general, and the speaker thought that much more discretion should be exercised and more consideration given the subject. It had been his experience, and he believed also the experience of others, to see cases of marked deformity of the septum and large turbinate bodies existing without a word of complaint from the patient, who may come with the history that some ten, or perhaps twenty, years ago his nose was broken, but that he has had no trouble with it, nor any sore throat, until that for which he desired treatment. There must be some other etiological factors, and Dr. Harris suggested that in every case other etiological factors should be searched for.

As a post-graduate teacher, Dr. Harris stated that every student appealed to him with regard to their course of instruction. One could not tell the average student that he must study one or two years. He agreed that, while he believes the post-graduate teacher has done an immense amount of work to help the students and to further the cause of special medicine, the post-graduate

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school has in turn done a certain amount of harm. With reference to the post-graduate student who takes a course of six weeks or so and then considers himself qualified for a specialist, his personal experience had been that the post-graduate school of to-day is doing work which is a greater credit to the profession than that done ten years ago.

Dr. MACKENZIE, in closing, said that one of the chief objects of his remarks was to call forth responses such as had come from the members who had taken part in the discussion. He did not wish Dr. Simpson to consider him over-conservative, as he had distinctly declared that no one resorted to necessary operations with more alacrity than himself. Dr. Delavan's experience with the frontal sinus only emphasized the fact insisted on in his remarks that these cavities are often opened to find nothing pathological in their interior. In regard to the question of hypertrophy of the middle turbinated body raised by Dr. Delavan, he said that the two cases were entirely dissimilar: on the one hand, it was a question of the removal of the enlarged middle turbinated of the more capacious side, as an obviously necessary preliminary to operation on the septum itself, while on the other hand, in the principle suggested by himself, it was a question of the sacrifice of some part of the external wall of the obstructed side as a substitute for any operation on the septum in certain cases in which it was for sufficient reason wise to let that structure alone.

TIC-DOULOUREUX FROM SPHENOIDAL DISEASE.

BY JOHN O. ROE, M.D.

IT is a singular fact that in no other part of the body do we so frequently have pain of like character and intensity to that which originates in the parts to which the facial nerve is distributed. This is accounted for by the fact that this nerve supplies parts or cavities having unyielding walls that intensify the pressure caused by diseased conditions on the sensitive nerve filaments.

In a paper read before the Medical Society of the State of New York in 1888,[1] I called attention to the relation of headaches to abnormal conditions of the nasal passages, and reported a number

[1] "The Frequent Dependence of Persistent and So-called Congestive Headaches upon Abnormal Conditions of the Nasal Passages."—*The Medical Record*, Aug. 25, 1888.

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of cases where persistent headaches had been entirely relieved by the removal of abnormal nasal conditions, usually in the form of intranasal pressure. Since that time it has been my constant and, I might say, almost daily experience, and doubtless that of my experienced confreres,[1] to meet with such cases, some of which have been associated with more or less facial neuralgia, hemicrania, migrain and occasionally tic-douloureux.

We find these conditions arising not only from abnormalities within the nasal passages, but from the accessory sinuses as well, for it has been from disease of these cavities that I have observed that some of the most painful conditions have originated.

The obscurity of the exciting cause in nearly all cases of tic-douloureux—as shown by the frequency with which excision of a portion of the nerve is performed to cut off the transmission of the pain, or the ganglionic center itself is excised to abolish its perception—renders it important that all unusual cases that may assist in directing us to any of the hidden sources of this affection, be reported.

Cases of tic-douloureux resulting from intranasal pressure, ethmoidal and antral disease, have been reported by Porcher[2] and Snow,[3] but I have found recorded but one case, by Berens,[4] in which the seat of the trouble was in the sphenoidal cavity. In this case, however, the maxillary antrum was also diseased and seemed to be an equally active factor in the causation of the tic. The rarity with which this affection is seen is doubtless due to the comparatively small number of cases of diseases of this cavity observed, on account of its obscurity.

The following case of tic-douloureux from sphenoidal disease is therefore so interesting and important that I herewith report it:

Mrs. T. O., age 68, was referred to me by Dr. Lauderdale, of Geneseo, N. Y., August 5, 1901, on account of a severe facial neuralgia, or tic-douloureux, which she had been having about two years; the pain being slight at first, but steadily increasing, both in frequency and intensity of the paroxysms.

When twelve years old, she, together with other children at play, was running under a swing in which two other children were

[1]"Headaches from Nasal Causes," Snow. Trans. Am. Laryng. Rhin. and Otolog. Society, 1897.

[2]Trans. Am. Laryngological Association, 1903, p. 220.

[3]Trans. Am. Laryngological, Rhinological and Otological Association, 1899, p. 160. Trans. Med. Soc. of the State of New York, 1904, p. 391.

[4]The Laryngoscope, March, 1894.

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swinging standing on the board. Not calculating the height of the swing correctly, as she was running under it, the board struck her on the bridge of the nose, breaking the nose, the concussion being so great as to render her unconscious for twelve hours and semi-conscious for two or three days.

The doctor who attended her, believing she could not live, made no attempt to restore the broken bones of the nose, but simply closed the wound in the skin.

Before the parts were entirely healed, she began to have a thin muco-purulent discharge from the left lachrymal duct, which continued for three or four years, when it subsided spontaneously.

From this time on she had no special trouble about the nose, except that she was subject to severe colds in the head which had increased in frequency during the last five years previous to the time I saw her, and, during the last year or two, she had been having an almost constant succession of colds during the winter.

During these attacks of coryza she would have severe pain about the nose and behind the eyes, together with a sensation of soreness, lasting four or five days. There was also a feeling of weakness about the right eye attended by a watery discharge. In August, 1899, the beginning of the tic-douloureux, she experienced her first twinge of acute pains in the right jaw, as she was driving to a picnic. While at the picnic attending to the wants of others, she got very warm and, on riding home in a canopy top carriage, she took cold, which increased the pain. During the beginning of the trouble she would have several paroxysms a day for a week or more; and then, perhaps for a week or two she would have none. The paroxysms were short but severe, lasting but one or two minutes. As they gradually grew more frequent and severe, the skin about the face became sensitive, and they were also more easily induced. Wiping the face with a towel, even lightly, would excite a paroxysm. The tip of the chin, and the angle of the lower jaw on the right side were the two spots where the skin was so sensitive that lightly touching it would excite paroxysms. Eating, chewing, swallowing or talking, or anything requiring the use of the tongue, would excite paroxysms.

The pain was confined mainly to the sides of the jaw in front of the ear, sometimes extending around the ear.

On examination, I found the right middle turbinate much enlarged, pressing against the septum, which was deflected to the left, occluding the left nostril. There was also considerable pressure against the septum in the region of the right posterior ethmoid cells, where an impaction had apparently taken place at the time of the injury.

I advised the patient to have this intranasal pressure removed as it was the undoubted cause of the pain. I saw no more of her, however, until the following August, when she came in for an-

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other examination and to see if I was still of the same opinion—as I decidedly was. She, however, was advised by a general surgeon to have the facial nerve resected—which she did, and which completely arrested the pain for about one year. The pain then began to return, the paroxysms being slight at first, but soon increasing in duration and intensity until they were quite as severe as before the operation, being almost agonizing. Getting tired, it was thought, increased the pain; but the paroxysms were more frequent and severe in the morning after the night's rest and durng the forenoon than in the afternoon and evening. During the night, while asleep, she was entirely free from pain or paroxysms.

On October 10, 1903, she returned to me again, and decided to follow my advice. I then operated on her, removing a portion of the right middle turbinate and the impaction in the region of the posterior ethmoid cells. This gave her complete relief for one week, when she began to have paroxysms of pain as frequent and severe as before. I told her at once that we had not gotten to the root of the trouble and that we must seek further for it.

On carefully exploring the posterior portion of the nasal chamber, I detected on the following day some pus coming from the sphenoidal sinus. On exploring this sinus I was unable to elicit the sensation of the probe striking against a solid wall, as in a normal sinus; but instead there was a sensation of a doughy substance, evidently a growth in the cavity. On the following day I performed the operation of opening this sinus freely, taking out the lower anterior wall and curetting the interior of the cavity, which was filled with a myxomatous growth.

Immediately on the removal of this growth the paroxysms of pain disappeared, not to return to the present time, having seen the patient the day before I left home; the cavity in the meantime having been thoroughly treated to prevent a return of the growth.

Recently she has felt some dull pain occasionally on the left side of the face, although not of a paroxysmal character. This is undoubtedly due to the intranasal pressure from the deflected septum which she has finally consented to have straightened since the warning pains have appeared on the left side. This I urged her to have done before, but she persisted in begging off because she felt so well after the operation on the sphenoid.

It is plainly to be seen that she had had from the time of her nasal injury a latent sphenoidal trouble, steadily increasing, which together with the deviated septum and other abnormalities, invited the frequent colds and which in turn aggravated the affection. It was, therefore, this long continued nerve irritation which culminated in this most distressing affection, tic-douloureux.[1]

[1]Since this paper was read, she returned, on June 15th, with increasing paroxysms of pain in the right side of the face. I then proceeded to

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A second case of tic-douloureux from sphenoidal disease has recently come under my observation since this paper was presented, a brief report of which I take the liberty of adding.

A woman, seventy years of age, was referred to me August, 1903, on account of a nasal difficulty associated with neuralgia and tic-douloureux of the left side of the face, which she had had for about fifteen years; her general health during this period had not been good. She was easily affected by cold, had frequent colds in the head, followed by more or less disability.

On examination, marked ethmoid pressure against the septum on the left side was found attended with considerable discharge.

On removal of this ethmoid enlargement the anterior ethmoid cells were opened and found diseased, and on further investigation, the posterior ethmoid cells were likewise diseased, filled with a myxomatous growth; these cells were thoroughly curetted and treated for a time until the disease was evidently cured.

The tic-douloureux, in a great measure, now subsided, and she passed from under my observation.

During the past three or four months, however, the paroxysms of pain in her face increased both in frequency and severity and she came back to me for further attention.

On carefully exploring the region at the site of the old operation, I found evidence of trouble in the sphenoidal cavity. This I opened, following backward from the track of the old operation. The cavity was filled with degenerate tissue, and there was also a spicula of bone running across it, exerting pressure; this was removed and the cavity curetted and treated, when the pain in a few days entirely disappeared and she has been quite free since, six weeks having now elapsed.

One of the principal dangers that has been encountered in opening this cavity has been hemorrhage. Miles[1] reports a case in which the life of his patient was barely saved by tying the carotid artery, and Hinkel,[2] Gleitzmann[3] and Hepburn[4] have reported

straighten the septum, which relieved the dull pain felt in the left side of the face, but not the paroxysms in the right side. As the pain in the right side was referable and seemed to be confined to the immediate site of the scar where the nerve had been excised, I thought this might now be the exciting cause of the pain, especially as the skin over this spot was so sensitive that a slight touch would bring on a paroxysm. I accordingly removed this scar tissue from the inside of the cheek when the paroxysms subsided, and she has had none since.

[1]Trans. Am. Laryngological Association, 1903, p. 238.

[2]Trans. Am. Laryngological Association, 1902, p. 92.

[3]Trans. Am. Laryngological Association, 1895, p. 91.

[4]Trans. Am. Laryngological, Rhinological and Otological Association, 1904, p. 68.

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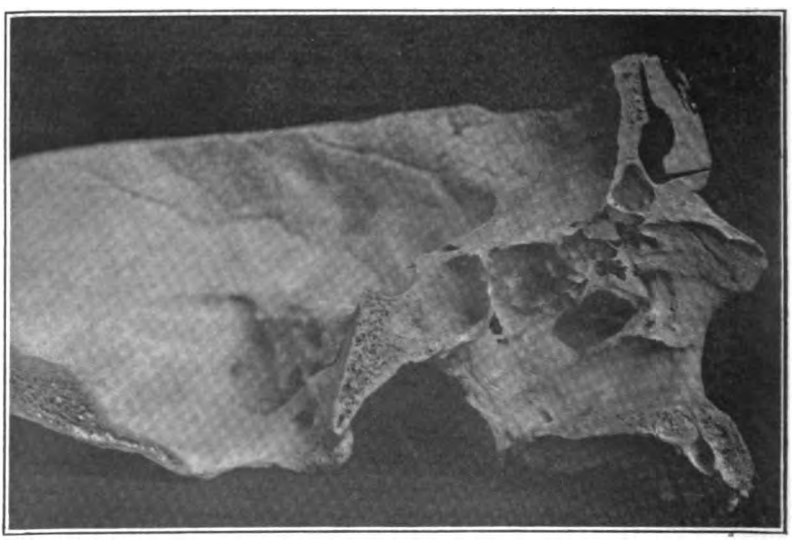
quite severe hemorrhages attending the operations for opening this cavity. In quite a large number of cases in which I have opened this cavity for various causes, mainly in connection with the opening of the ethmoid cells for empyemia, it has been my good fortune to have been spared this unpleasant complication. In studying the anatomical relations of the sphenoid to the ethmoid region it is readily seen that the sphenoidal cavity is simply a continuation backward of the ethmoid cells, the posterior central portion of this group of cells extending backward from one of the frontal sinus to the other, as shown by the fact a continuous chain of cells extending all the way around from one side of the frontal sinus to the other, as shown by the



accompanying illustration taken from a specimen in the author's collection.

In Jansen's[1] operation for opening the sphenoid through the maxillary antrum we attain the same end, only by a different route, for he reaches the sphenoid through the posterior ethmoid cells in the same manner as I have proposed—by way of the nose. In ordinary cases of simple empyema of the sphenoidal cavity, enlargement only of the natural opening sufficient to freely drain and medicate the cavity is all that may be required. It must be remembered, however, that the anatomical variations in different skulls are often so great that no one operation is practical in all

[1]"Zur radical operation Chronischer combinirter Empyeme der Neben höhlen der Nase."—Congrès de Moscow, Arnt, 1897.

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cases, and in each instance the method must be selected that meets the requirements of the case under consideration.

In opening freely the posterior ethmoid cells with a pair of rongeur or biting forceps, it is with the greatest ease that the sphenoidal cells can be opened through the lower posterior wall of the posterior ethmoid cell, and by opening the sphenoid in this manner hemorrhage is avoided for the reason that the sphenopalatine vessels run around this region instead of across it.

Discussion.

DR. A. LOGAN TURNER wished to emphasize what Dr. Roe said regarding the necessity of educating the profession to the knowledge that one may have intranasal cases of an important kind which are apt to be overlooked.

DR. G. HUDSON-MAKUEN briefly mentioned a case of a prominent Philadelphian who does considerable public speaking, and who suffers from the following symptoms coming on often during a public address. He is taken with severe supraorbital pains and a sense of giddiness, so that he has been compelled to sit down. About twice a week he has been awakened at night by the discharge of a teaspoonful of bloody pus into the pharynx and he is obliged to get up and expectorate it. For two or three days thereafter he feels better. Then he gradually begins to feel, as he expresses it, "no good." Dr. Makuen had been unable to find the slightest evidence of pus in the nasal cavities at any time. He had had difficulty in making a rhinoscopic examination because the patient has a sensitive pharynx. The patient has also a marked deflection of the septum which makes it difficult to get a view of the sphenoidal region on the right side. Dr. Makuen stated that he thought this might be a case of sphenoid involvement on the side of the deflected septum, but that the symptoms had not yet been sufficiently severe to warrant an operation.

DR. EMIL MAYER presented, as a matter of interest and of record, the brief history of a man who had sphenoidal disease after an attack of African fever. The sphenoidal disease was on the right side. This patient had been under Dr. Mayer's care for some time and had been entirely free from any head pains for over two months, when he suddenly developed an occipital pain on the other side. But most persevering search failed to show any evidence of sphenoidal disease on the newly affected side. His physician failed to find the malarial plasmodium. The turbinate was removed from that side, but no evidence of pus was found. A second examination for the malarial germ was more successful, as it was found, and treatment instituted with success. This was an instance in which the patient might have been subjected to much operative interference, had a persistent search for the cause not been made.

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DR. CORNELIUS G. COAKLEY referred particularly to the rather common symptom in suppurative disease of the accessory sinuses, viz,. the frequency with which these patients complain of taking cold. In young children, of course, this is frequently associated with different conditions in the lymphoid hypertrophy of the nasopharynx. But in almost every case of chronic accessory sinus disease which has come under Dr. Coakley's care the patient has more or less indeterminate amounts of secretion, and every time this secretion increases a little the patient complains of taking cold. Many times the nasal membrane is more or less swollen and is accompanied by difficulty in nasal respiration, but at other times it is not associated with any great amount of intranasal obstruction and, although the patients complain at these times of discharge, if they are closely questioned during the intervals of the attacks they acknowledge that then there is no increased occlusion. If the nose is examined during the intervals very little pus will be found.

The speaker agreed with Dr. Roe in his method of approaching the sphenoid. It had always seemed to him that one is safer in taking the nasal route, as this allows the field of view to be expanded, and also allows the removal of such portions of the middle turbinate as may be necessary in order to thoroughly see the field upon which one is operating. It was believed that the method of removal of the anterior wall differs in individual cases.

The great difficulty in the diagnosis of this disease is to make sure of the involvement of the sphenoid sinuses. For this purpose Dr. Coakley first used the method of probing, but for the last two years had employed a flexible cotton carrier of steel, sufficiently firm not to bend readily, and pointed. After covering the upper end slightly and winding it tightly with cotton for the last half inch, he then passed the carrier to the lower border of the middle turbinate. The point of the probe that touches the lower border of the anterior turbinate is the unbent point; the posterior end therefore lies anywhere from one-half to three-eighths of an inch from the lower border. This was brought against the anterior surface of the body of the sphenoid. It was readily recognized if it happened to pass into the nasopharynx. When it was against the anterior wall of the body of the sphenoid Dr. Coakley tipped it up and down a little laterally and it was surprising how quickly the normal opening of the sphenoid was entered.

DR. HARRIS P. MOSHER referred to one point which had presented itself to him in a rather extensive examination of the anatomy of the sphenoid, that is, the chance for extensive nerve lesions to result from disease of that cavity. The sinus is practically surrounded by large and important nerves, so that the speaker has been surprised that empyema does not cause more trouble even than it does. The second point brought up by the

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speaker was the method of approaching the sinus. Last year, after working this subject over on specimens, Dr. Mosher stated that he became very enthusiastic over the antrum route. He understood Dr. Roe to state that this method of approach to the sphenoid was not a sure one. He did not agree with this. Anatomically, it is a sure route, and Jansen has demonstrated that it is a practical route. Dr. Mosher agreed with the speakers of the day that the first route to be tried is the one through the nose, but stated that he believed that in extensive sinus disease, that is, where the antrum, the sphenoid and the ethmoid cells of one side are involved, that the route to the sphenoid through the antrum was the one to be employed.

Dr. J. H. Bryan expressed as his opinion that the maxillary route for entering the sphenoid was the method par excellence in certain cases in which the sphenoid cavity was anomalously placed and when it could not be well approached through the nose. He did not believe any other method offers such successful results.

Dr. T. Passmore Berens stated that he had recently performed the Jansen operation, the radical operation through the maxillary route, for the removal of the ethmoidal cells and anterior wall of the sphenoidal sinus. In fourteen of these cases he found thirteen with sphenoidal sinusitis. In four of the cases a well-marked tic-douloureux was present. Dr. Berens described the case referred to by Dr. Roe, illustrating the Jansen operation for sphenoidal sinusitis with a very well-marked trigeminal neuralgia, in a woman of 72 years, with relief of the neuralgia. There was a return of suppuration in the sphenoid and this suppuration was again accompanied by all symptoms of tic-douloureux. Recently the patient had a return of the tic, with coextisting suppuration in the sphenoid; as this suppuration subsided the tic also disappeared. As to entering the sphenoid cells by way of the maxillary antrum, the speaker had no difficulty in doing so in these cases; in some he entered through the posterior ethmoidal cells, while in others an entrance was made through the nasal opening The instrument used for the breaking down of the anterior wall of the sphenoidal sinus was a sharp bone curette. This was found to work as well in the sphenoidal as in the ethmoidal region. In the fourteen cases mentioned he encountered three cases of very severe hemorrhage from the region of the superior palatine vessel. In each of these cases the hemorrhage was controlled without great difficulty by the use of the ordinary artery forceps,—grasping the bone and soft parts between the blades and twisting. As regards the diagnosis of these fourteen cases operated upon, Dr. Berens stated that eight of them had occipital and vertical pains at the same time and more or less facial neuralgia, so that now when a patient came to him complaining of pain in the vertex and in the occipital region, accompanied by suppuration in the

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posterior nares, he invariably looked at the sphenoidal sinus, and, as a rule, found it diseased.

As regards the Jansen operation, Dr. Berens considered it the route of choice in chronic cases where there is disease of the antrum and of the ethmoids accompanied with sphenoid disease. He did not, however, consider it the operation of choice in cases of simple slight suppuration or subacute suppuration in the ethmoidal cells and sphenoidal sinus. It is stated that the nasal route for breaking down the anterior wall of the sphenoid in subacute cases is a good one, but that it is dangerous if one extends the opening too far laterally.

DR. ROE, in closing the discussion upon his paper, said that with reference to the case mentioned by Dr. Makuen he should judge it to be a case of sphenoidal disease. In respect to Dr. Mayer's case no one would expect to open the sphenoid unless he was sure it was diseased and that the cause of the neuralgia would be found there. If other causes for the symptoms were found they should be removed before considering opening the sphenoid. If, however, no other trouble was found, and the symptoms pointed to disease of the sphenoidal cavity, it should be most carefully investigated. Dr. Roe was glad Dr. Coakley had emphasized the importance of the symptom of frequent colds in the head with increase of the nasal discharge in all cases of accessory sinus disease, and it was a prominent symptom in the different cases he had seen and also in this case he had just reported. Dr. Roe had read Dr. Coakley's article regarding his method of exploration of this cavity through the nasal opening and thoroughly agreed with him. Nearly everyone has a different method, though all may arrive at the same conclusion. Dr. Roe had been in the habit of using an aluminum probe having a bulbous end, which is very light, can be bent in any direction and is comparatively safe. The sense of touch was much more delicate with this than with a silver probe. He has had excellent results from the use of this instrument. He stated that with regard to the different routes for the operation discussed by Drs. Mosher, Bryan and Berens, no one should think of going through a normal maxillary antrum to open up the sphenoid. Jansen only proposed this route as an easy and practical method of reaching the sphenoid in conjunction with a radical operation where the antrum and ethmoid cells were also diseased, and in which I think all could agree. If one had opened the maxillary antrum he could readily go on to the sphenoid if he found the anatomical formation such as to warrant him in extending the operation. No one case, as already stated, could be judged by another, as in each individual the anatomical formations might be found entirely different, and therefore each case was a factor unto itself.

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Candidate's Thesis.

THE APPLIED ANATOMY OF THE FRONTAL SINUS.

BY HARRIS PEYTON MOSHER, M.D.

THE material for this paper is derived from a condensation and re-arrangement of the chapter on the frontal sinus in the book on the anatomy of the sinuses published by Sieur and Jacob and from the study of the floor of the sinus on one hundred heads, and fifty cleaned skulls in the laboratory of the Harvard Medical School. The drawings are by the writer and where they are not credited to others they are from the writer's specimens. The aim of the paper is to give the applied anatomy of the frontal sinus with especial reference to the anatomy of the floor.

There are two frontal sinuses, a right and a left. They are separated by a median partition which corresponds to the saggital suture of the skull. The sinuses are placed in the middle and inferior part of the anterior face of the frontal bone. Each sinus represents the termination of the anterior part of the ethmoidal labyrinth of which it is an off-shoot. The sinuses stretch like wings transversely over the anterior portion of the orbit. They can be represented diagrammatically by drawing an arc which has for its center the mid-point of the base of the nasal bones and extends from the middle of one supraorbital ridge to the middle of the other.

A horizontal section of the skull shows that the sinuses have the form of a triangular pyramid. The base of the pyramid is in the middle line while the apex extends outwards a variable distance over the orbit. There are, therefore, three sides or faces to the sinus, the anterior face which is subcutaneous, the posterior or cerebral face and the inferior or orbito-nasal face. In the posterior inferior angle of the pyramid, the width of the corresponding half the ethmoidal notch from the median septum there is an opening which connects the cavity of the sinus with the nose. See Fig. No. 1 and Fig. No. 2.

All recent studies tend to demonstrate that the frontal sinuses are ethmoidal cells which have insinuated themselves between the

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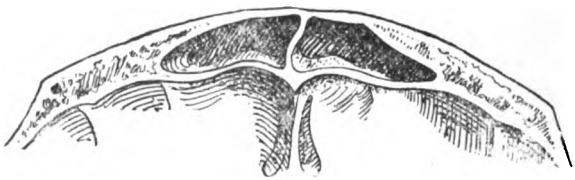

Fig. No. 1.—Sieur and Jacob. Figure showing the pyramidal form of the sinus.

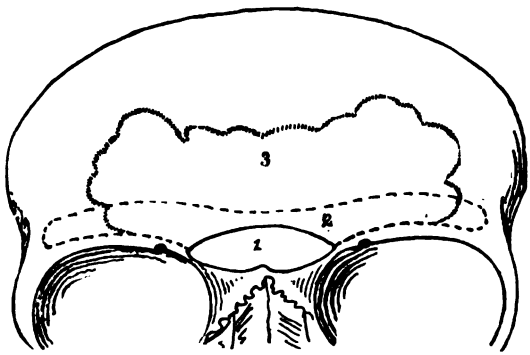

Fig. No. 2.—Hajek. Diagrammatic figure showing the varieties of the large frontal sinus.

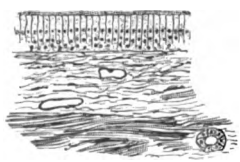

Fig. No. 3.—The mucous membrane of the frontal sinus.

Fig. No. 4.—Piersol. The respiratory mucous membrane.

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two tables of the frontal bone. The following facts support this view: The development of the sinuses corresponds in time with that of the ethmoid cells. The sinuses are not present at birth but begin to appear toward the end of the first year or during the second. They spring from the level of the anterior part of the ethmoidal labyrinth, and enlarge progressively upwards and from within outwards. When the sinuses are small they can be distinguished from the neighboring ethmoidal cells only by the fact that they are found between the two layers of the frontal bone. Further, the sinuses open indifferently into the two grooves at the top of the middle meatus, into which the ethmoid cells open, and the ethmoidal cells often mound into the floor of the sinus. Finally, upon the whole length of the ethmoidal notch of the frontal bone there is a row of little half cells which is matched and completed by a similar row of cells upon the upper surface of the lateral mass of the ethmoid bone.

The Size of the Sinus.—According to certain writers it is possible to estimate the size of the sinus by the prominence of the superciliary ridge. Roughly this is true. It is owing to the size of the sinus and to its exension under the root of the nose that the brow of a man does not slope backward so much as that of a woman. The face of a child resembles the face of a woman in this respect because the sinus does not begin to develop until after birth and does not reach its full size until between twenty and twenty-five years. Defective development of the sinus is a characteristic of certain negro tribes. At eight years of age the sinus measures 6-7mm. (¼in.). The average capacity of the sinus ranges between 4-5c.c. (1-1½ drachms). Owing to more or less deviation of the septum which divides the sinuses they are seldom of the same size.

The Mucous Membrane of the Sinus.—The mucous membrane is a derivative of the mucous membrane of the nose and has the same extensive vascular and nerve supply. The mucous membrane of the nasal fossa consists of two kinds, the respiratory and the olfactory. The mucous membrane of the respiratory region is distinguished from that of the olfactory region by its thickness (4mm.) and by the presence of a venous network of large size. The epithelium is ciliated and of the stratified columnar type. Within its superficial layer there are numerous goblet cells. The tunica propria is composed of fibrous connective tissue

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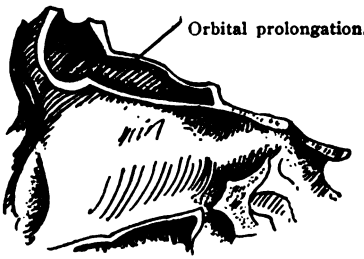

Fig. No. 5.—Sieur and Jacob. The backward or orbital prolongation.

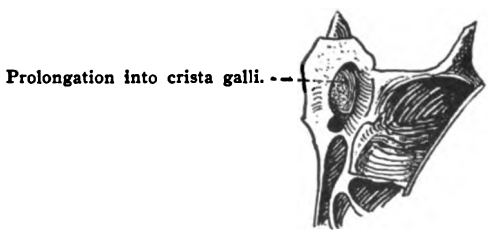

Fig. No. 6.—Prolongation of the frontal sinus into the crista galli.

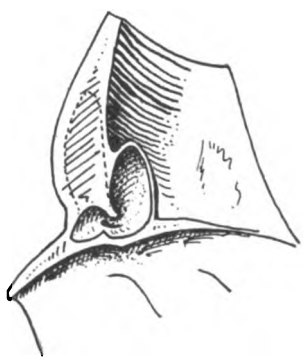

Fig. No. 7.—Sieur and Jacob. Prolongation into the crista galli and into the root of the nasal bone.

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containing many clefts occupied by leucocytes. Occasional nodules of lymphoid tissue are scattered through this. The mucous membrane contains numerous racemose glands which open on the free surface by funnel like pits. They are mixed glands, some of which secrete serous fluids, some mucous products. The veins of the mucosa are so wide and plentiful that the layer in which they run is practically cavernous tissue. The mucous membrane of the accessory spaces of the nasal fossa, the frontal, the maxillary and the sphenoidal sinuses and the ethmoidal cells, closely resembles that of the respiratory region. These tracts are distinguished chiefly by the marked reduction in the thickness of the mucous membrane of the sinuses (.02 mm.). The meagre supply of glands is another distinguishing feature. (Piersol, Normal Histology, p. 402.) See Fig. No. 3 and Fig. No. 4.

Arteries.—The arteries spring fom the spheno-palatine artery and enter the sinus by its duct. The anterior ethmoidal artery furnishes a few small branches which enter sometimes the posterior face, sometimes the inferior face.

Veins.—The veins make a compact network in the mucous membrane. They are especially developed on the external wall. They are in direct communication with the orbit. There is a second venous connection between the sinus and the orbit through the ethmoidal veins. These pierce the posterior and the inferior wall. The veins of the posterior or the cranial wall come into relationship with the superior longitudinal sinus or better with the vein of the foramen cecum. The greater part of the venous blood naturally empties into the spheno-palatine vein, the vein which collects the blood from the mucous membrane of the turbinates and the regions between.

Lymphatics.—The lymphatics are a part of the lymphatic system of the nose. They are, therefore, in relation, the same as the lymphatics of the nose, with the sub-arachnoid space by means of minute bony canals in the walls of the sinus.

Nerves.—The nerves of the frontal sinus come from the ethmoidal branch of the nasal nerve. The nerves are very numerous and are arranged in a network which makes the mucous membrane very sensitive.

The Form of the Sinus.—There are two distinct varieties of the frontal sinus, the small sinus, and the large.

The Small Sinus.—The small sinus corresponds to the rounded

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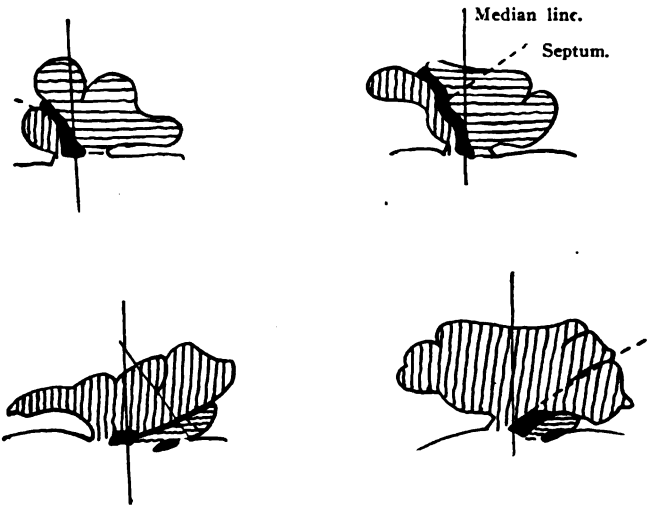

Fig. No. 8.—Tilley.—Deviation of the median septum.

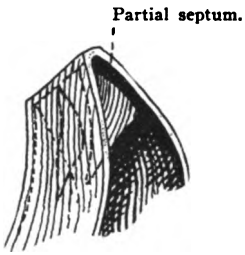

Fig. No. 9.—Figure showing partial septa at the summit of the sinus parallel with the median septum. Diagrammatic.

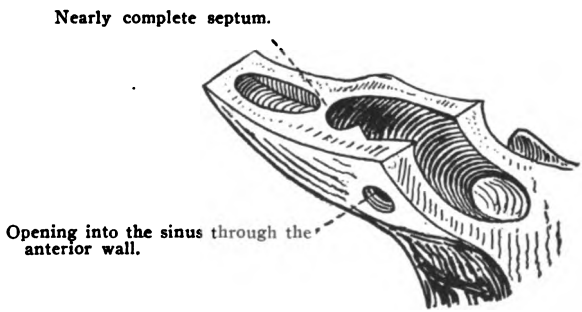

Fig. No. 10.—Large septum nearly dividing the sinus into two parts. An opening through the anterior wall in the position indicated in the drawing would lead the operator to think that the septum was the outer wall of the sinus.

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excavation which is ordinarily present at the level of the inner angle of the orbit at its frontoorbital part. This excavation is placed behind the posterior border of the ascending process of the superior maxilla and in front of the os planum of the ethmoid and immediately above the lachrymal bone. The small sinus does not rise above a line drawn between the two supraorbital notches, while its anterior border is limited by a line running up from the crest of the lachrymal bone. When the cavity of the sinus is so reduced the anterior wall is very thick. See Fig. No. 22.

The Large Sinus.—The large sinus extends upwards nearly through the glabella and outwards over the inner half of the orbit. Normally in the median line its height varies between 20-25mm. (¾in-1in.). This may be increased in very large sinuses to 40-50 mm. (1½in.-2in.), the sinus reaching even the frontal protuberance. See Fig. No. 2.

The Prolongations of the Large Sinus.—The large sinus is very commonly increased in size by sending out two prolongations, one outward over the supraorbital ridge, and one backward over the orbit. See Fig. No. 5.

The Outward Prolongation.—Ordinarily the outward limit of the sinus is 25-27mm. (1in.) from he median line, that is, the middle of the supra orbital ridge. Occasionally these limits are exceeded and the sinus extends some 45-50mm. (2in.), to the malar bone. See Fig. No. 2.

The Backward Prolongation.—The backward prolongation extends backward on the inner side of the orbit to end blindly about 15-10mm. (⅝in.) from the rim of the orbit. The height of the prolongation is scarcely 2-3mm. (⅛in.). It comes into direct relation with the anterior ethmoid cells. See Fig. No. 5.

Two other small prolongations of the sinus are sometimes found; a prolongation into the crista galli and a prolongation into the root of the nasal bone. See Fig. No. 6 and Fig. No. 7.

The cavity of the frontal sinus is frequently narrowed by the ethmoid cells mounding into it. The relationship of the ethmoid cells will be discussed in speaking of the floor of the sinus.

The Septum of the Sinus.—Normally the septum of the sinus is a triangular plate of bone placed vertically between the two sinuses. Its anterior border is attached to the posterior face of the saggital suture, its posterior border corresponds to the ridge of the frontal bone upon which the falx is inserted, while the

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Fig. No. 11.—Rib of bone guarding the opening of the sinus.

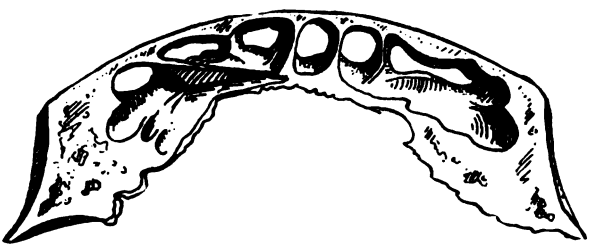

Fig. No. 12.—Sieur and Jacob. Partial septa making pockets in the upper part of the sinus.

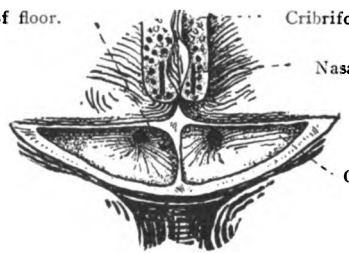

Fig. No. 13.—The divisions of the floor of the sinus.

Fig. No. 14.—The two forms of the floor of the sinus, the funnel-shaped floor and the saucer-shaped floor.

Fig. No. 15.—1. Transverse section of the funnel-shaped sinus. 2. Transverse section showing a step jutting out from the median septum.

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apex is uppermost and is placed at the junction of the anterior and the posterior wall. The base is joined with the anterior superior edge of the perpendicular plate of the ethmoid bone. Usually the septum is quite thin, but only rarely are there perforations in it. I found but one undoubted perforation in one hundred heads. When the sinus is very small the septum is thick owing to the development in it of spongy tissue. It may measure in such cases from 6-12mm. (¼-½in.).

The deviations of the septum are extremely variable. They have been figured and described by Tilley. See Fig. No. 8. On account of its surgical bearing, it is important to remember that no matter how much deviated the upper part of the septum may be the base is nearly always in the median line. Owing to these deviations the danger of opening the sinus of the opposite side has to be borne in mind. Three times in twenty subjects Sieur and Jacob found the sinus of one side encroaching on that of the other. Twice this encroachment amounted to 10mm. (⅜in.) and once to 5mm. (⅛in.). Exploring the sinus by the naso-frontal route in the first two cases would have resulted in opening the sinus of the opposite side, in the other case both sinuses would have been opened. I have not found in the examination of my specimens that the sinus of one side so frequently crosses the middle line as the figures just given would seem to indicate. Sieur and Jacob give the figures at 17 per cent. I should place the percentage much lower, something like three to five per cent. Nevertheless, the fact that this does occur is important in the applied anatomy of the sinus. Naturally, therefore, the sinus should be entered from as low a point as possible.

Incomplete or Partial Septa.—See Figs. Nos. 9, 10, 11, 12.

In addition to the median septum the frontal sinus often has partial septa. These have two seats of predilection. The commonest place is at the summit of the sinus where the anterior and the posterior walls meet, and the second and more dangerous place is the beginning of the backward or orbital prolongation. Rarer and more accessible septa are found on the median septum itself. These are usually roughly vertical.

The septa which occur in the summit of the sinus run parallel with the median septum, so that the pockets which they make empty freely into the lower part of the main sinus. Where, however, they run obliquely, the reverse of this is true. The thick-

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Fig. No. 16.—Sinus with right angular ledge projecting from the median septum.

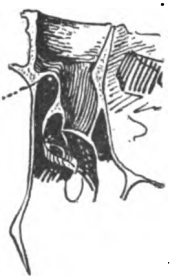

Fig. No. 17.—Sinus with projecting ledge from the median septum under which runs the anterior ethmoidal artery.

Fig. No. 18.—Sinus similar to No. 17 seen from above.

Fig. No. 19.—Funnel-shaped sinus.

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ness of these septa scarcely exceeds 1-2mm., that is, they are about as thick as stout paper. Their size depends upon the distance between the two tables of he frontal. Their height varies between 5-10mm. (⅛-¼in.). I found these small septa in about 10 per cent. of the cases. In about 1 or 2 per cent of the cases there occurs a very large septum which almost divides the sinus in two parts. See Fig. No. 10. At first sight it seems as if the sinus is completely divided, but just at the lower posterior angle of such a partition there is always a communication with the main sinus. One could readily mistake such a partition for the outer wall of the sinus unless he had this point in mind and passed a probe round the lower end of the partition into the part of the sinus beyond.

The partial septa of the backward prolongation of the sinus are easier to get at than those of the upper part. Usually there are not more than two or three of these. The greatest number recorded is four. These septa have a tendency to cross the axis of the prolongation obliquely, not to run parallel with it. For this reason the pockets which they make drain very poorly.

The study of the relations of the sinus is the study of the sides which compose it. There are three such sides or faces, and the naso-frontal canal which connects the frontal cavity with the nasal cavity.

The Anterior or Frontal wall.—The anterior wall, when it exists, is subcutaneous in its whole extent. Exploring the sinus through this wall would be most easy if it were not for its thickness and the great variability of the size of the sinus.

Limits of the Anterior wall.—Where the development of the sinus is normal the anterior wall begins below at the naso-frontal suture and ends in the median line half way to the frontal protuberance. On the sides it extends to the mid point of the orbital rim. Taking subjects as they run on the dissecting table the absence of the anterior wall occurs more frequently than writers usually state. Sixty-nine sinuses in thirty-seven subjects were examined with care on this point (Sieur and Jacob). Twenty-two sinuses (31.8 per cent.) were limited to the superior internal angle of the orbit and had no connection with the anterior wall. Forty-seven sinuses had more or less relationship with the anterior wall and all corresponded to that part of the naso-frontal eminence which is just behind the root of the nose. The area to

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Fig. No. 20.—Saucer-shaped sinus.

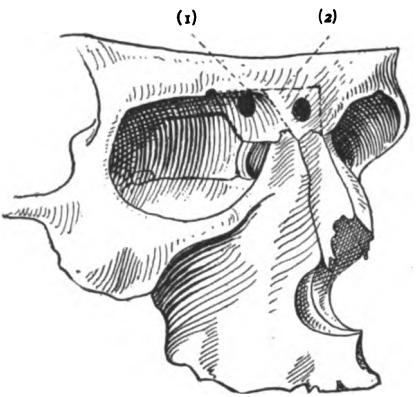

Fig. No. 21.—1. Region where the sinus, however small, can always be opened. 2. Region where the sinus can be opened in two-thirds of the cases.

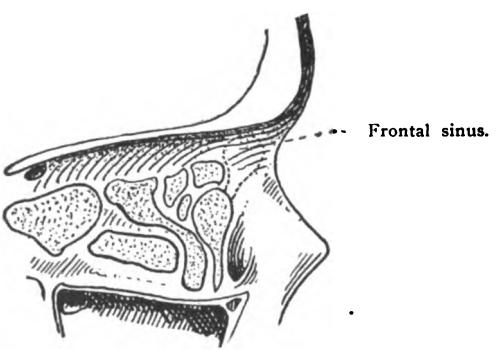

Fig. No. 22.—Sieur and Jacob. Frontal Sinus reduced to the size of an anterior ethmoid cell.

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which the forty-seven correspond is an irregular trapezium bounded within by the medio-frontal suture, below by the naso-frontal suture, and above by a line between the two supra orbital notches. This space corresponds in two-thirds of the cases to the cavity of the sinus. It cannot be accepted unreservedly, however, because once in three cases the sinus does not reach so far forward. This space occupies a very low position so that if one has reason to think that there is a good sized sinus it is the point of election for approaching the sinus from the anterior or frontal face. In approaching the sinus from this point it must be remembered that occasionally the sinus of the opposite side will be opened.

The average thickness of the anterior wall is 4mm. (⅛in. +). It may be as little as 1-2mm. or as great as 7-12mm. ($^1/_{32}$-½in.).

Structure of the Anterior Wall.—The anterior wall is ordinarily compact at the orbital rim. For the rest of its extent it is made up of spongy tissue, especially at the frontal protuberances. This layer of spongy tissue is what gives the free bleeding when the sinus is entered from the anterior wall. Owing to many small channels in the bone this wall is in relation with the external circulation. By means of these infection can travel both inward and outward. The anterior wall often ends superiorly in a set of cells which rim it about like a crown. These cells occasionally require opening up after the fashion of the cells of the mastoid process.

The Posterior or Cranial Wall.—The posterior wall corresponds to the cavity of the cranium. This wall is made up of two parts, a vertical part and a horizontal part. The horizontal part is the roof of the backward or orbital prolongation. See Fig. No. 5.

In the median line and above, the posterior wall is separated from the posterior wall of the opposite sinus by the ridge of the frontal bone upon which the falx is inserted. Below, at the level of the orbit, this wall unites with the crista galli and at the sides joins the cribriform plate of the ethmoid. Outward, the same as above and below it is not especially marked off. It is not smooth on the sinus side because of the septa which spring from it. It is roughened on its intra-cranial surface by the ridges for the convolutions of the brain. Although the cranial wall is made of compact bone its thickness is barely one millimeter. It be-

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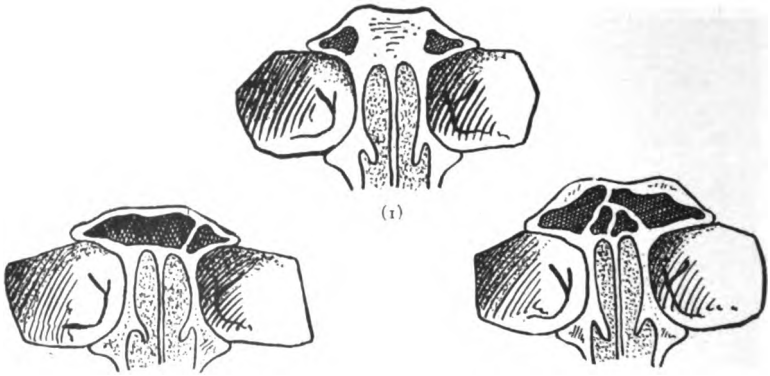

Fig. No. 23.—Sieur and Jacob. The relationship of the floor of the sinus with the roof of the nasal fossa. 1. Nasal roof not in relation with the sinus. 2. The right frontal sinus in relation with the nasal fossa of both sides. 3. Anterior ethmoidal cells intervening between the floor of the sinus and the roof of the nose.

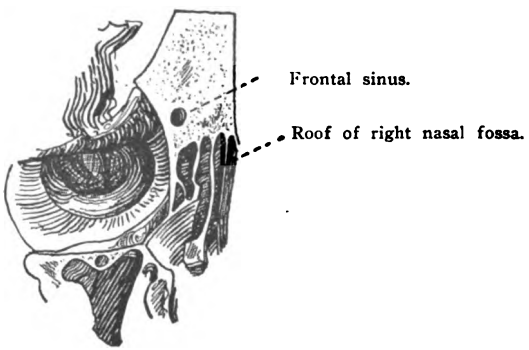

Fig. No. 24.—Frontal sinus small and not in relation with the roof of the nasal fossa. Sinus ¼-in. (7 mm) from the median line.

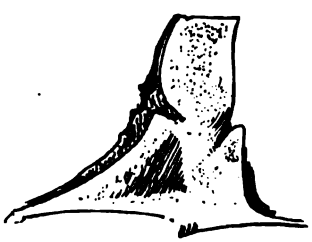

Fig. No. 25.—The same specimen as Fig. No. 24 seen from the side. Thickness of the frontal wall at the root of the nose ⅞-in. (22 mm.).

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comes thinner as it runs forward so that anteriorly it is even less able to withstand trauma, and on that account generally shares in all radiating fractures of the anterior part of the base of the skull. On the other hand, it is more out of the reach of pus than the other walls of the sinus.

Fairly often there is in the neighborhood of the foramen cecum a bony canal, running to the cranial cavity and emptying into the frontal sinus. Normally there are openings in the internal wall at the level of the frontal protuberances which give passage to veins which finally end in a sub-meningeal vein of considerable size. At this level the dura mater is firmly attached to the bony wall.

The posterior wall is always in relation with the cavity of the sinus, no matter ho wsmall this may be. This cannot be said of the anterior wall. When the sinus is the size of a pea and occupies the superior internal angle of the orbit its roof is formed by the bone anterior to the ethmoidal notch and the cavity of the sinus is placed just outside the crista galli and the termination of the cribriform plate.

The Floor of the Frontal Sinus.—Anatomically the floor of the frontal sinus is the orbito-nasal wall because it extends over the roof of the nasal fossa and over the inner part of the anterior portion of the orbit (See Fig. 13). The floor is either funnel shaped or saucer shaped (See Fig. 14). Very often the nasal part contains a distinct ledge which in transverse section makes the septal wall of the sinus appear as if a step of bone had been added to it (See Fig. 16). Under this step runs a branch of the anterior ethmoidal artery. See Figs. Nos. 17, 18, 19, 20.

The Orbital Part.—The outer part of the orbital portion is on a slightly higher plane than the inner or nasal part. It is generally triangular, and measures transversely 15-29mm. (⅝-1⅛in.) and antro posteriorly 10-15mm. (⅜-⅝in.). In a small sinus the floor consists of but little except this orbital part. In such a sinus the floor is found in the superior internal angle of the orbit. The bone which makes it descends like a wedge between the posterior border of the ascending process of the superior maxilla and the os planum of the ethmoid. Below it articulates with the lachrymal bone. Measuring from the lachrymal bone its height is 12-20mm. (½-¾in.). Its width is less extensive, varying be-

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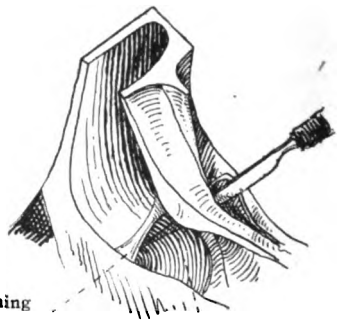

Fig. No. 26.—Prolongation forward of the ethmoid plate in a finger-like process. The point of the knife is inserted into this and is seen through the outer wall of the prolongation. This prolongation is in the posterior internal angle of the floor of the sinus.

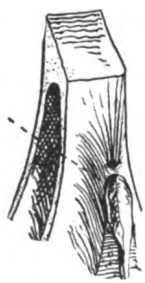

Fig. No. 27.—The forward prolongation of the ethmoid plate seen from above.

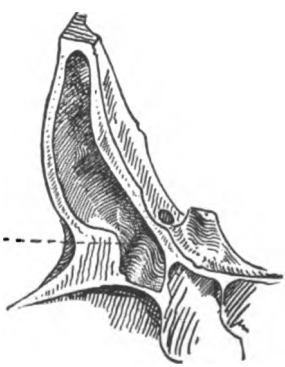

Fig. No. 28.—A marked canal for the vein of the foramen cæcum. This canal mounds into the postero-internal angle of the sinus.

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tween 12-15mm. (½-⅝in.). The bone is so thin here that it has been broken by a scratch. (See Fig. 21.) It participates in all fractures at its level which run to the orbital border and is easily wounded by blunt instruments if they strike under the inner rim of the orbit. Fencing accidents have furnished some classical cases. It offers but little resistance to pus.

The Nasal Part of the Floor of the Frontal Sinus.—The nasal part of the floor is that part which is placed in front of the ethmoidal notch. Anteriorly it articulates with the nasal bones and the ascending process of the superior maxilla. Internally it is in relation with the median septum of the sinus and posteriorly with the ethmoid cells. Externally it is continuous without demarkation with the orbital portion of the floor. In the posterior angle of this quadrilateral if it exists, or if it does not, in the posterior part of the floor and the width of half the ethmoidal notch from the median septum, there is an opening which connects the sinus with the middle meatus of the nose. In the smallest sinuses the floor as such ceases to exist and the cavity of the sinus is pushed outward into the superior internal angle of the orbit and appears simply as an anterior ethmoid cell, which developmentally it is.

The under surface of the nasal part corresponds internally with the roof of the nasal fossa and externally rests upon the ethmoid cells at the summit of the midde meatus. The relation of the floor of the frontal sinus to the nasal vault is very variable. Sometimes the floor of the sinus is directly over the roof of the nose; oftener it is not. In sinuses of a median caliber the floor may be reduced to a slit which crosses the nasal fossa only very slightly. As has just been said, in the smallest sinuses, there is no relationship at all. Furthermore, the sinus of the opposite side occasionally crosses the median line and lies over the nasal fossa on both sides. Even in cases where the floor of the sinus occupies 5-8mm. of the nasal vault (¼in.) the bone may be so thick that it can be penetrated only by a drill. These anatomical considerations make the puncture of the floor of the sinus rarely feasible. See Figs. 23, 24, 25.

The part of the nasal floor which corresponds to the summit of the middle meatus is of more practical interest than that which is over the nasal fossa. The ethmoid cells frequently mound into this and narrow the cavity of the sinus or make drainage by the natural opening into the nose difficult. It is common to have one

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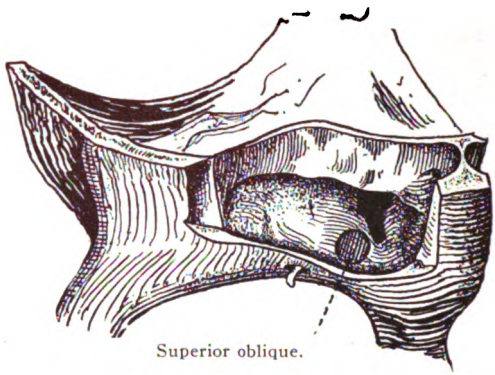

Fig. No. 29.—The attachment of the superior oblique muscle.

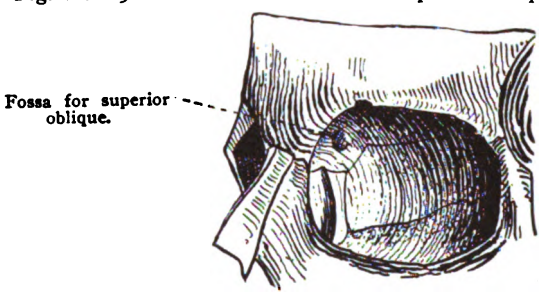

Fig. No. 30.—The fossa for the attachment of the superior oblique.

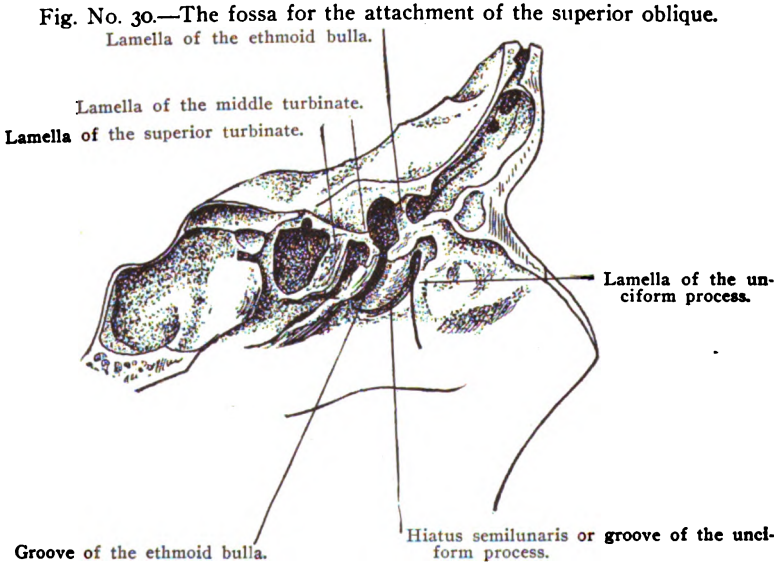

Fig. No. 31.—Hajek. Figure showing the basal lamellæ of the ethmoid labyrinth.

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of these cells attain a considerable size and project into the sinus, especially posteriorly. Such a cell is often called the frontal bulla. When catheterization of the sinus is successful the catheter generally forces its way through some such cell, and it is at the expense of such cells that drainage is obtained in the operation of enlarging the naso-frontal duct from the sinus down into the nose. The sizable openings into the sinus which one occasionally finds are due probably to the breaking down of some such anterior ethmoid cell which was in relation with the floor of the sinus. See Fig. No. 35.

The posterior internal angle of the sinus is of the greatest surgical importance. This is the part of the nasal portion which is in front of the ethmoidal notch. See Figs. Nos. 13, 26, 27. It is the dangerous area of the sinus. Nature seems to recognize this because there is often a small rib of bone running diagonally downward and outward which protects this region. The ethmoid plate often sends forward here a finger-like process which invites accidents. See Fig. No. 26. Also, in this posterior internal angle of the sinus, but on the median septum, however, the vein which runs in the foramen cecum and is the beginning of the superior longitudinal sinus not rarely mounds into the cavity of the sinus. See Fig. No. 28. It should be borne in mind in exploring the sinus that it is necessary to keep away from the median septum at least the width of the corresponding half of the ethmoidal notch, and always to do the strong curetting forward and outward, never backward and inward.

The pulley of the superior oblique muscle is in relation with the floor of the sinus. The best guide to this is the notch for the supraorbital nerve. This is one inch from the medial line (25 mm.). The pulley is three-quarters of an inch from the median line (18mm.), one-quarter of an inch nearer the median line than the notch and one-quarter of an inch (6mm.) below it. In the wet specimen the pulley is flush with the rim of the orbit, but in the cleaned skull the fossa for the pulley or the spine for the pulley, if this replaces the fossa, is an eighth of an inch (3mm.) back from the rim. On the cleaned skull the examination of 50 specimens showed that the fossa for the pulley is roughly half way between the top of the lachrymal bone and the supraorbital notch, and that the lower part of the fossa of the pulley is on a line with the highest part of the naso-frontal suture. See Figs.

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Fig. No. 32.—Sieur and Jacob. 1. Frontal sinus opening directly into the groove of the unciform. No naso-frontal canal. 2. Marked naso-frontal canal.

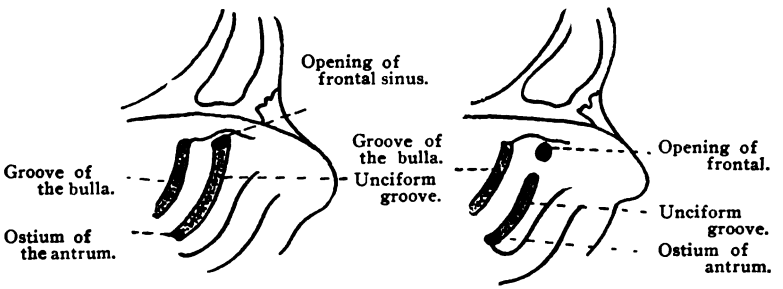

Fig. No. 33.—Hajek. 1. Frontal sinus opening into the groove of the unciform. 2. The groove of the unciform ends blindly. The frontal sinus opens just above the unciform groove and in line with it.

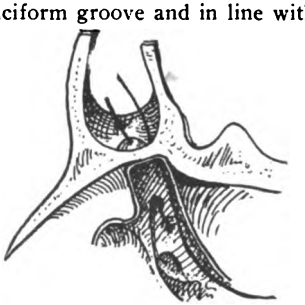

Fig. No. 34.—Sieur and Jacob. An anterior ethmoidal cell mounding into the floor of the frontal. Probe passed through this into the sinus. The posterior arrow enters the sinus through the ostium.

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No. 29, 30. The attachment for the pulley occupies a space about one-quarter of an inch (6mm.) square. In breaking through the roof of the orbit, therefore, one should go back from the anterior wall three-eighths of an inch 1c.c.) and should be at least one inch (25mm.) from the median line. In order to get far enough away from the anterior wall one must keep close to the posterior or cranial wall of the sinus. This is easier to do if the operator stands behind the patient. The pulley is attached to the periosteum of the orbit and readily strips away with it. It is well, therefore, to consider that if the periosteum is disturbed at all within the orbital rim that the pulley is disturbed. In opening a sinus of the small type the pulley is always encountered.

As the frontal sinus is simply an enlarged ethmoid cell the rest of the ethmoid cells, especially the anterior ones, have very important relationships with it.

The scheme of the ethmoid region given by Hajek (See Fig. No. 31) is the simplest and the most practical. The ethmoid labyrinth consists of a certain number of basal lamellæ intervening spaces or grooves. The lamellæ, with the exception of the first, which is incomplete, extend upward to the cribriform plate and outward to the os planum. The first lamella is made by the unciform process of the ethmoid. It is defective above. The second lamella, the lamella of the ethmoid bulla, is complete and runs entirely through the ethmoid labyrinth. The third lamella gives attachment to the middle turbinate, and the fourth to the superior turbinate. In the spaces between these lamellæ the ethmoid cells develop and, in the adult, in part obliterate them. The ethmoid cells are best classified according to their method of draining. They are divided, therefore, into the cells of the middle meatus and the cells of the superior meatus, or according to a little looser classification into anterior and posterior ethmoid cells. The anterior cells drain into the middle meatus and the posterior cells into the third meatus. The number of cells of the middle meatus is from five to seven, and the number of the cells of the third meatus is three to five. One or two ethmoid cells are generally developed in the lamella of the bulla. This results in the formation of a rounded swelling called the ethmoid bulla which projects into the middle meatus.

The Middle Meatus.—The cavity of the middle meatus has the form of a funnel, flattened transversely. The internal wall

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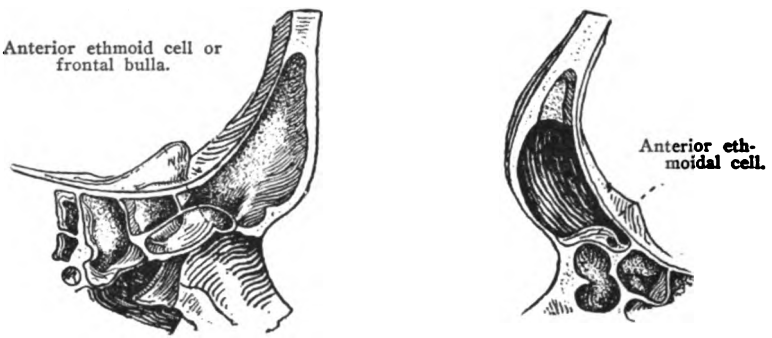

Fig. No. 35.—1. An anterior ethmoidal cell (frontal bulla) projecting into the floor of the sinus. 2. An anterior ethmoid cell opening into the sinus.

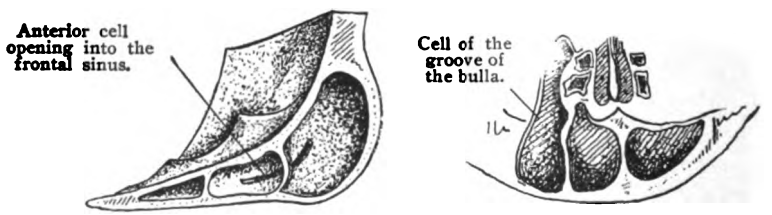

Fig. No. 36.—Onodi. Anterior ethmoid cell opening into the sinus.

Fig. No. 37.—Cell of the groove of the bulla passing to the outside of the sinus and extending to the orbital rim.

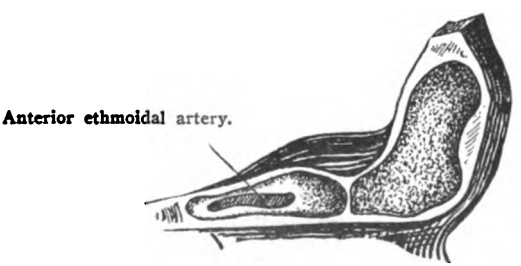

Fig. No. 38.—Onodi. Canal of the anterior ethmoidal artery open on the inner wall of an anterior ethmoid cell.

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of this is formed by the middle turbinate and the outer wall by the outer wall of the nasal fossa. The base of the funnel is below and the apex is placed above and in front. Upon the external or nasal wall there are two ridges, the ridge of the unciform process and the ridge of the ethmoid bulla. Between these two there is a semilunar groove called the groove of the unciform and back of the bulla a groove, which is not always so well marked, the groove of the bulla. The groove of the bulla generally ends blindly. The groove of the unciform often ends blindly also, and often ends in an ethmoid cell. It is very common to have one or two ethmoid cells developed at the summit of this groove. These cells are in direct relation with the floor of the frontal sinus. Very often, as pointed out above, a cell in this position called the frontal bulla attains a considerable size and mounds into the floor of the sinus. See Figs. No. 32, 33, 34.

As has just been said the groove of the unciform generally ends blindly. Once in four cases this groove is directly continuous with the drainage canal of the frontal sinus, the naso-frontal duct. Rather rarely the frontal sinus opens into the groove of the bulla. (6 cases in 150.) In a majority of the cases, however, (once in every two cases) the frontal sinus opens separately, above and internal to the unciform groove and in direct line with it.

In the lower part of the groove of the unciform the opening of the maxillary antrum is placed and once in four cases in the upper part, the opening of the frontal and front and back of the groove-like grapes from a central stem empty the majority of the anterior ethmoid cells. A few of these empty back of the bulla into the posterior part of the middle meatus. Another ethmoid cell, the cell of the agger nasi occasionally either mounds into the floor of the frontal sinus or projects backward and blocks the groove of the unciform, or as it is called in the older nomenclature, the hiatus semilunaris. In like manner any enlargement of the ethmoid bulla, especially any forward enlargement, also blocks this groove. The bulla, therefore, holds the key to the drainage of the frontal sinus, the maxillary sinus and most of the anterior ethmoid cells. As the anterior end of the middle turbinate hides the bulla, practically all exploring and all operating for sinus disease begins with the removal of the anterior end of the middle turbinate.

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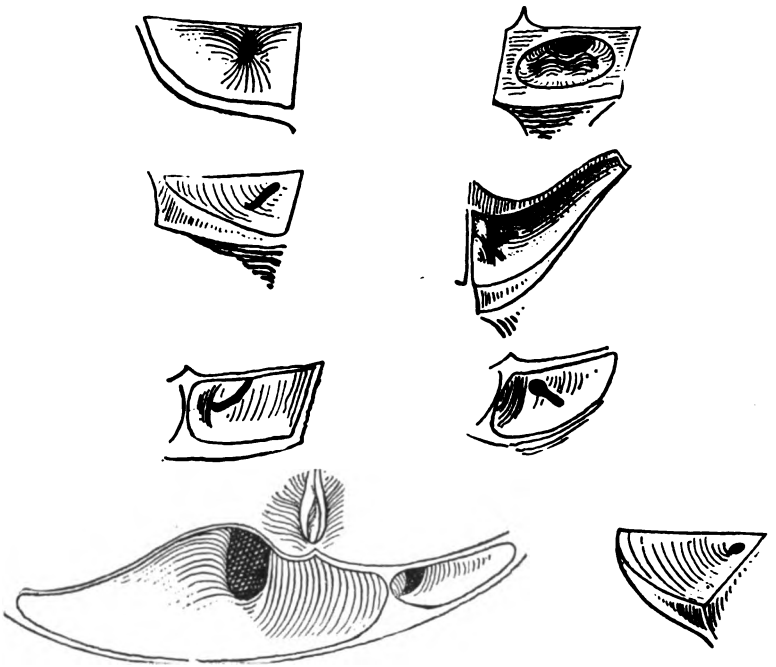

Fig. No. 39.—Different forms of the opening of the naso-frontal duct in the floor of the sinus. The next to the last drawing shows the exension of the right sinus beyond the middle line into the region of the left sinus. The opening of the right sinus into the nose, the largest found by the writer measured ¼ by ½ inch (6 mm—12 mm).

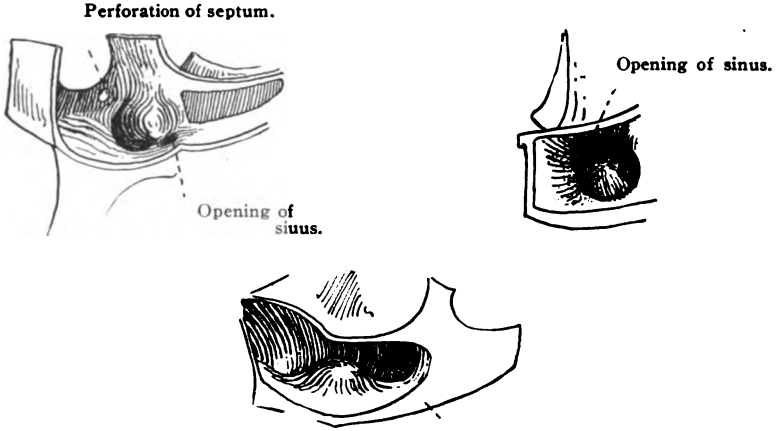

Fig. No. 40.—Examples of the frontal bulla mounding into the floor of the sinus.

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The anterior ethmoid cells of the upper part of the groove of the unciform not only often mound into the floor of the frontal sinus but often open into it. See Fig. No. 35. Further these cells are often connected in a series with each other and with the sinus. Fig. No. 36. Onodi has pointed out recently that the anterior ethmoidal artery occasionally runs in a half canal in one of these cells. When this condition exists and the cell in which this occurs is in connection with the sinus there is another way opened up for infection to spread into the cranial cavity. No. 38. Again, not rarely one of the cells of the groove of the bulla enlarges and comes into relation with the sinus. Instances have been found where such a cell has extended forward to the orbital rim. Such an anomaly has given rise to the report of an accessory frontal sinus. There is probably no such thing as an accessory frontal sinus. Anatomically there is no such thing as the absence of the sinus. It is always present as an ethmoid cell. See Fig. No. 37.

The Frontal Canal.—The majority of writers describe in connection with the frontal sinus a canal which unites it with the middle meatus of the nose. Poirier makes this 15mm. (½ in.) long in the male and 10mm. (⅜in.) in the female. Its form is cylindrical, but it is slightly compressed from side to side. The diameter varies between 2-3mm. ($^1/_{16}$-⅛in.). It can be entered by bougies corresponding to numbers 6, 7, 8, 9, 10, of the French scale.

The canal cannot be isolated from the cul-de-sacs of the ethmoid cells which surround it and make it. When these are atrophied the duct does not exist and the sinus is in direct relation with the middle meatus. When the cells at the upper part of the middle meatus are well developed they mound into the cavity of the sinus and lengthen the duct. In one-half of the cases a probe can be passed from the frontal sinus through its duct down into maxillary antrum. Pus, therefore, can find its way into the antrum in a still greater number of cases.

The Superior Opening of the Naso-Frontal Duct.—See. Fig. No. 39. The upper opening of the canal is placed the width of the corresponding half of the ethmoidal notch from the median septum of the sinus. Its form and dimensions may be those of the canal below or it may differ greatly from this. Ordinarily the opening is roughly oval. When the ethmoid cells mound into

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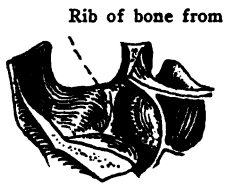

Fig. No. 41.—Rib of bone running diagonally outward and downward from the septum and guarding the opening of the sinus.

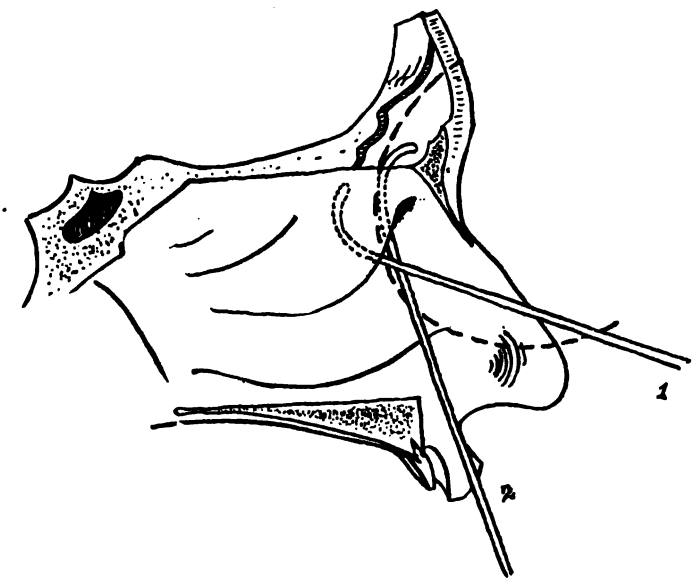

Fig. No. 42.—Modified from Sieur and Jacob. Method of catheterizing the frontal sinus: 1. First position. 2. Final position. The dotted half circle gives the curve which a probe must have in order to come out of the anterior nares when passed down from the sinus through the naso-frontal duct.

the floor of the sinus they modify its shape, but what is of greater importance, they interfere with the entrance of secretion into it. Fig. No. 40 gives marked examples of this. In one case the opening is placed over and behind the frontal bulla, in another behind and below it. Even when there is no projective ethmoid cell to narrow its size the opening may be simply a transverse slit, or a slit with the axis slanting toward or away from the median septum.

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Often the opening is at the bottom of a deep pit and guarded by a rib of bone which slants downward and outward from the median septum. See Fig. No. 41.

Catheterization of the Naso-Frontal Duct.—A study of the anatomy of the naso-frontal duct shows that it is only by chance that the sinus can be catheterized. The direction of the canal is very oblique from above downwards and from before backward. The opening of the duct is on the average 50mm. (2in.) away from the meatus.

In order to catheterize the sinus it is almost always necessary to remove the anterior end of the middle turbinate. Of course the meatus must be cleared of polypi. The procedure of catheterizing the sinus is as follows: See Fig. No. 42. The catheter is bent at an angle a little over or a little under 90 degrees, and introduced between the anterior end of the middle turbinate and the ethmoid bulla. It is then brought forward and rotated outward until it engages in the groove of the unciform. The handle is then depressed and if the naso-frontal duct is continuous with the groove of the unciform, as it is once in four cases, the catheter glides into the sinus and its handle falls backward and lies snugly against the incisor teeth. In case the groove of the unciform ends blindly the catheter brings up in this pocket or in an anterior ethmoid cell. In the majority of cases the catheter breaks through the base of this ethmoid cell and enters the sinus. If this does not happen and one finds himself in an anterior cell the catheter is withdrawn slightly, rotated inward in order to jump the bar at the top of the groove of the unciform and so enter the opening of the sinus which in one-half of the cases is above and internal to this and in a direct line with it. In order to pass a probe from the sinus down into the middle meatus and out of the nose the probe should be bent to correspond to half or three-quarters of a circle two inches in diameter. See. Fig. No. 42.

PRESENTATION OF INSTRUMENTS AND SPECIMENS.

Dr. T. R. French presented through the Secretary an improved adenoid forceps (see page 48).

Dr. H. L. Swain presented a specimen of tonsillolith.

Dr. J. W. Farlow presented a salivary calculus which he had removed from Wharton's Duct near the submaxillary gland. It had caused symptoms of obstruction and swelling for about 8

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years. A very fine probe was passed with difficulty into the duct, the stone felt, an incision made and the calculus removed by forceps and curette. It was round and smooth, like a pencil.

Dr. Farlow also showed a set of instruments, devised by Dr.

L. E. White, of Boston, for the window operation on the nasal septum.

Dr. Farlow also showed a photograph of a girl 13 years old who had a fibrous band extending from the upper part of the

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cartilaginous septum in the right nostril half way down the upper lip. It was as large round as a pencil and was very firm. Its upper end pressed against and pushed up the lateral cartilage of the right nostril, making a conspicuous and deforming hump. This latter is, however, not well shown in the photograph. The opening of the nostril was much larger than that of the left side and was partially filled by the band, the lower end of which faded gradually into the tissues of the lip.

This condition had existed since birth, but had never given rise to any symptoms, and was merely a disfigurement. The case was seen by several surgeons who had never seen a similar condition and had no theory as to how such a band came to exist in such a situation.

Under ether, Dr. Farlow made an incision in the band high up inside the vestibule and dissected out what proved to be a very tough fibrous band.

Dr. J. W. Gleitsmann presented a glass and hard rubber syringe for intra-tracheal injections.

Dr. J. Payson Clark presented a laryngeal applicator.

Dr. C. F. Theisen presented a wet specimen showing the tongue and larynx. The epiglottis was much enlarged and the pharyngeal tissues as well as the mucosa of the larynx and trachea were covered during life with a creamy membranous deposit looking like diphtheria, but bacteriological examination showed it to be due to streptococcus infection.

Dr. D. Bryson Delavan presented a Chevalier Jackson transilluminator which had exploded just as he was about to place it in a patient's mouth. He had previously used it successfully and was at a loss to account for the accident nor had he been able to obtain any explanation thereof from practical electricians. There had probably been some structural defect in the instrument. It was of 8-candle power, which Dr. Delavan believed was too strong to obtain the best results in transillumination. A 4-candle power lamp was strong enough.

Dr. C. F. Theisen presented a specimen of exfoliated ethmoidal body.

In connection with their respective papers Dr. Ingals, Hubbard and Roe presented instruments and specimens.

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AMERICAN LARYNGOLOCIAL ASSOCIATION.

BUSINESS MEETING.

The Twenty-sixth Annual Congress of the American Laryngological Association met at the Hotel Chelsea, Atlantic City, N. J., Thursday, June 2d, 1904. The Association was called to order by the President, Dr. J. H. Hartman of Baltimore, at 10 A. M., who introduced as guests Drs. Otto T. Freer of Chicago and James J. Mooney of Buffalo. During the sessions of the Congress the following Active Fellows were registered:

C. E. BEAN, St. Paul, Minn.
T. P. BERENS, New York City.
H. S. BIRKETT, Montreal Canada.
J. H. BRYAN, Washington, D. C.
W. E. CASSELBERRY, Chicago, Ill.
W. F. CHAPPELL, New York City.
J. PAYSON CLARK, Boston, Mass.
C. G. COAKLEY, New York City.
F. C. COBB, Boston, Mass.
J. SOLIS-COHEN, Philadelphia, Pa.
A. COOLIDGE, JR., Boston, Mass.
D. BRYSON DELAVAN, New York City.
J. W. FARLOW, Boston, Mass.
W. J. FREEMAN, Philadelphia, Pa.
J. W. GLEITSMANN, New York City.
J. L. GOODALE, Boston, Mass.
T. J. HARRIS, New York City.
J. H. HARTMAN, Baltimore, Md.
F. E. HOPKINS, Springfield, Mass.
THOMAS HUBBARD, Toledo, Ohio.
E. FLETCHER INGALS, Chicago, Ill.
J. M. INGERSOLL, Cleveland, Ohio.
SAMUEL JOHNSTON, Baltimore, Md.
C. H. KNIGHT, New York City.
D. BRADEN KYLE, Philadelphia, Pa.
S. W. LANGMAID, Boston, Mass.
WILLIAM LINCOLN, Cleveland, Ohio.

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J. H. LOWMAN, Cleveland, Ohio.
A. W. MACCOY, Philadelphia, Pa.
J. N. MACKENZIE, Baltimore, Md.
G. H. MAKUEN, Philadelphia, Pa.
EMIL MAYER, New York City.
H. P. MOSHER, Boston, Mass.
J. E. NEWCOMB, New York City.
F. R. PACKARD, Philadelphia, Pa.
WILLIAM PORTER, St. Louis, Mo.
W. SCOTT RENNER, Buffalo, N. Y.
J. E. RHODES, Chicago, Ill.
C. C. RICE, New York City.
J. O. ROE, Rochester, N. Y.
W. K. SIMPSON, New York City.
H. L. SWAIN, New Haven, Conn.
C. F. THEISEN, Albany, N. Y.
A. W. WATSON, Philadelphia, Pa.—44.

The opening session was occupied in the reading of the President's Address and of the papers assigned for the morning. The Association then went into executive session. The first order of business was the election of new members.

The following were the candidates: For Corresponding Fellowship (there being one vacancy), DR. B. FRAENKEL, Berlin, proposed by Drs. Mayer and MacCoy. And for Active Fellowship (there being three vacancies), Dr. T. PASSMORE BERENS, New York City, proposed by Drs. Swain and Harris; title of thesis, "An Operation for the Correction of External Deformities of the Bridge of the Nose." Dr. JOHN M. INGERSOLL, Cleveland, proposed by Drs. Lowman and Lincoln; title of thesis, "A Study of the Development of the Nose and its Accessory Cavities." Dr. HARRIS P. MOSHER, Boston, proposed by Drs. Coolidge and Cobb; title of thesis, "The Applied Anatomy of the Frontal Sinus."

The tellers, Drs. Mayer and Lincoln, reported that all the candidates had been elected.

Drs. Rice and Renner were appointed a committee to audit the accounts of the Treasurer.

The election of a committee of five to nominate officers for the ensuing year resulted as follows: Dr. Delavan, Chairman; Drs. Swain, Bryan, Rhodes and Simpson.

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Following the executive session the Fellows were entertained at lunch at the Hotel Chelsea by the President, Dr. Hartman.

The afternoon was occupied in reading of papers and discussion thereon.

At the executive session preceding the scientific business of the second day, Friday, June 3rd, the following reports were read and accepted:

Report of the Secretary.

Following precedent, the Secretary herewith presents a copy of the Transactions of the last Congress. Owing to the promptness of the Fellows in handing in their material for the volume, it was possible to issue it on October 1, 1903. Under our present system of publication there is no reason why under ordinary circumstances the annual volume may not appear early each fall. It simply depends on the promptness of the Fellows.

During the past year there have been no deaths of either Active or Corresponding Fellows. One Active Fellow has been dropped for non-payment of dues and one has resigned. The elections of yesterday and the resignation referred to completes the list of Corresponding Fellows and leaves one vacancy in the list of Active Fellows.

During the year two meetings of the Council have been held and the minutes thereof will now be read.

Other matters of importance will come up in due order of business at the present session.

Respectfully submitted,

JAMES E. NEWCOMB, *Secretary.*

Atlantic City, June 3, 1904.

Annual Report of the Treasurer, 1903-1904.

Receipts.

Balance from old account	$73.45
Sale of dinner tickets, 1903	228.00
Sale of Transactions	27.50
Loan, Riverside Bank	400.00
Arrears of dues and assessments	55.00
Dues and assessments for current year	1,025.00
Total	$1,808.95

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Expenditures.

Paid annual dinner, 1903	$222.00
Stenographer's bill, 1903	22.90
Repayment of loan due Treasurer	160.00
Treasurer Sixth Triennial Congress	39.75
Repaid bank loan	400.00
Interest on same	8.00
Publishing Transactions, 1903	567.96
Programmes, Congress 1904	25.50
Printing and stationery	45.00
Secretary's sundries	17.97
Total expenditures	$1,509.08
Cash to new account	299.87
	$1,808.95

Statement of Assets and Liabilities, June 1, 1904.

Assets.

Cash in bank as per report	$299.87
Unpaid dues and assessments	65.00
Postage in office	5.43
Total assets	$370.30

Liabilities, none.

Respectfully submitted,
JAMES E. NEWCOMB, *Treasurer.*

Atlantic City, June 3d, 1904.

Audited and found correct.
Signed,
CLARENCE C. RICE,
W. SCOTT RENNER,
Auditing Committee.

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Librarian's Report.

Since the last meeting the librarian has to report that 3 bound and 4 unbound volumes and 39 pamphlets have been added to the library.

Respectfuly submitted,

J. H. BRYAN,
Librarian.

The Committee on Nominations presented through Dr. Swain the following report:

For *President*—Dr. Clarence C. Rice, New York City.

For *First Vice-President*—Dr. Thomas Hubbard, Toledo, Ohio.

For *Second Vice-President*—Dr. Walter J. Freeman, Philadelphia, Pa.

For *Secretary and Treasurer*—Dr. James E. Newcomb, New York City.

For *Librarian*—Dr. J. H. Bryan, Washington, D. C.

For *Members of Council*—To serve for three years, Dr. D. Bryson Delavan, New York City; to serve for four years, Dr. J. H. Hartman, Baltimore, Md. Delegate to the Triennial Congress of American Physicians and Surgeons, Dr. W. K. Simpson, New York City.

The next Congress shall be held at Atlantic City, the date to be determined by the Council.

The following Amendment offered last year by Dr. Swain was adopted:

Article III, Section 3, of the Constitution shall read: "The Fellows (Active) shall not exceed one hundred (100) in number.

At the close of the executive session the reading of papers with discussion was resumed and continued at the afternoon session. In the evening the annual dinner was held at the Hotel Chelsea. Forty Fellows were in attendance and two guests—Drs. A. Logan Turner of Edinburgh, Scotland, and Otto T. Freer of Chicago.

At the closing session of Saturday morning, June 4th, the reading of papers and discussion thereon was concluded. At the executive session following, the following resolution was adopted: "*Resolved*, That in the opinion of the American Laryn-

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gological Association it is desirable that the Executive Committee of the Congress of the American Physicians and Surgeons should consider the advisability of altering the constitution of the Congress and report progress thereon to the several societies interested at their sessions of 1905 and 1906."

The report of the Nominating Committee was again read. An amendment leaving the place of meeting to the decision of the Council was proposed and adopted. The Secretary was directed to cast an affirmative ballot for the nominees named in the report. This was done and they were declared elected.

The retiring President, Dr. Hartman, appointed Drs. Delavan and Simpson to escort the President-elect, Dr. Rice, to the Chair. On taking the chair, Dr. Rice expressed his obligations to the Association for the honor conferred upon him and by the vote of the Association conveyed the thanks of the Fellows to the retiring officers for their faithful service.

It was voted that the Congress should send a letter of congratulation to its Honorary Fellow, Señor Manuel Garcia of London, in honor of his approaching centenary birthday.

There being no further business, the Congress adjourned.

JAMES E. NEWCOMB,
Secretary.

LIST OF MEMBERS.

ACTIVE FELLOWS.

1905.

1880. BEAN, C. E., Germania Life Bldg., St. Paul, Minn.
1904. BERENS, T. PASSMORE, 35 Park Ave., New York.
1893. BIRKETT, HERBERT S., 252 Mountain St., Montreal.
1893. BLISS, ARTHUR AMES, 117 South 20th St., Philadelphia, Pa.
1878. BOSWORTH, FRANCKE H., 41 Park Ave., New York.
1901. BROWN, J. PRICE, 37 Carlton St., Toronto, Can.
1892. BROWN, M. R., 34 Washington St., Chicago, Ill.
1891. BRYAN, J. H., 818 17th St., Washington, D. C.
1889. CASSELBERRY, WILLIAM E., 34 Washington St., Chicago, Ill.

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1896. CHAPPELL, W. F., 7 East 55th St., New York.
1897. CLARK, J. PAYSON, 409 Marlborough St., Boston, Mass.
1902. COAKLEY, C. G., 49 West 58th St., New York.
1899. COBB, FREDERIC C., 11 Marlborough St., Boston, Mass.
1878. COHEN, J. SOLIS-, 1824 Chestnut St., Philadelphia, Pa.
1893. COOLIDGE, A., JR., 613 Beacon St., Boston, Mass.
1882. DEBLOIS, THOMAS AMORY, 48 Gloucester St, Boston, Mass.
1881. DELAVAN, D. BRYSON, 1 East 33d St., New York.
1892. FARLOW, J. W., 234 Clarendon St., Boston, Mass.
1901. FREEMAN, W. J., 1832 Spruce St., Philadelphia, Pa.
1879. FRENCH, THOMAS R., 150 Joralemon St., Brooklyn, N. Y.
1897. FROTHINGHAM, RICHARD, Sydenham Bldg., Madison Ave. and 58th St., New York.
1878. GLASGOW, WM. C., 2847 Washington Ave., St. Louis, Mo.
1880. GLEITSMANN, J. W., 46 East 25th St., New York.
1898. GOODALE, J. L., 307 Beacon St., Boston, Mass
1896. HARDIE, T. MELVILLE, 34 Washington St., Chicago, Ill.
1903. HARRIS, T. J., 117 East 40th St., New York.
1878. HARTMAN, J. H., 5 West Franklin St., Baltimore, Md.
1888. HINKEL, F. WHITEHILL, 581 Delaware Ave,. Buffalo, N. Y.
1881. HITCHCOCK, URBAN G., 51 West 29th St., New York.
1893. HOPE, GEORGE B., 133 West 72d St., New York.
1895. HOPKINS, F. E., Springfield, Mass.
1895. HUBBARD, THOS., 205 Ontario St., Toledo, O.
1901. HYATT, FRANCK, 1022 14th St. N. W., Washington, D. C.
1878. INGALS, E. FLETCHER, 36 Washington St., Chicago, Ill.
1904. INGERSOLL, JOHN M., 50 Euclid Ave., Cleveland, Ohio.
1882. IVES, FRANK L., 117 East 30th St., New York.
1878. JOHNSTON, SAMUEL, 204 West Monument St., Baltimore, Md.
1901. KING, GORDON, 624 Gravier St., New Orleans, La.
1885. KNIGHT, CHARLES H., 147 West 57th St., New York.
1878. KNIGHT, FREDERICK I., 195 Beacon St., Boston, Mass.
1898. KYLE, D. BRADEN, 1517 Walnut St., Philadelphia, Pa.
1880. LANGMAID, SAMUEL W., 71 Newbury St., Boston, Mass.
1878. LEFFERTS, GEORGE MOREWOOD, 212 Madison Ave., N. Y.
1894. LELAND, GEORGE A., 669 Boylston St., Boston, Mass.

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1903. LINCOLN, WILLIAM, Lennox Bldg., Euclid Ave. and Erie St., Cleveland, O.
1897. LOGAN, JAMES E., 1208 Wyandotte St., Kansas City, Mo.
1888. LOWMAN, JOHN H., 441 Prospect St., Cleveland, O.
1886. MACCOY, ALEXANDER W., 216 South 15th St., Philadelphia, Pa.
1883. MACKENZIE, JOHN N., 605 Washington Place, Baltimore, Md.
1898. MAKUEN, G. HUDSON, 1627 Walnut St., Philadelphia, Pa.
1896. MAYER, EMIL, 25 East 77th St., New York.
1899. MCKERNON, J. F., 62 West 52d St., New York.
1904. MOSHER, HARRIS P., 828 Beacon St., Boston, Mass.
1892. MURRAY T. MORRIS, 17th and H Sts., Washington, D. C.
1901. MYLES, R. C., 46 West 38th St., New York.
1893. NEWCOMB, JAMES E., 118 West 69th St., New York.
1903. PACKARD, FRANCIS R., 1831 Chestnut St., Philadelphia, Pa.
1892. PORCHER, W. PEYRE, 85 Broad St., Charleston, S. C.
1878. PORTER, WILLIAM, 3886 Washington Ave., St. Louis, Mo.
1903. RENNER W. SCOTT, 361 Pearl St., Buffalo, N. Y.
1897. RHODES, J. EDWIN, 100 State St., Chicago, Ill.
1884. RICE, CLARENCE C., 123 East 19th St., New York.
1902. RICHARDSON, C. W., 1317 Connecticut Ave., Washington, D. C.
1893. ROALDES, A. W. DE, 624 Gravier St., New Orleans, La.
1879. ROE, JOHN O., 44 Clinton Ave. South, Rochester, N. Y.
1878. SHURLY, E. L., 32 Adams Ave. W., Detroit, Mich.
1892. SIMPSON, W. K., 952 Lexington Ave., New York.
1889. SWAIN, H. L., 232 York St., New Haven, Conn.
1903. THEISEN, CLEMENT F., 172 Washington Ave., Albany, N. Y.
1892. THRASHER, A. B., The Groton, 7th and Race Sts., Cincinnati, O.
1888. VAN DER POEL, S. OAKLEY, 346 Broadway, New York.
1892. WAGNER, HENRY L., 522 Sutter St., San Francisco, Cal.
1892. WATSON, A. W., 126 South 18th St., Philadelphia, Pa.
1890. WRIGHT, JONATHAN, 44 West 49th St., New York.

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HONORARY FELLOW.

1880. GARCIA, MANUEL, Mon Abri, Shoot-up-Hill, Cricklewood, London, N. W., England.

CORRESPONDING FELLOWS.

1880. BRUNS, PAUL, Tübingen, Würtemberg, Germany.
1896. CHIARI, OTTOKAR, Bellariastrasse 12, Vienna, Austria.
1901. COLLIER, MAYO, 145 Harley St. W., Cavendish Square, London, England.
1890. DE LA SOTA Y LASTRA, R., 7 Calle de Torqueros, Seville, Spain.
1893. DESVERNINE, C. M., Cuba 52, Havana, Cuba.
1904. FRAENKEL, B., Bellevue-Strasse 4, Berlin W. 9, Germany.
1901. GRANT, DUNDAS, 18 Cavendish Square W., London, England.
1902. HEYMANN, PAUL, 60 Lützowstrasse, Berlin W., Germany.
1894. HOLDEN, E., 13 Central Ave., Newark, N. J.
1892. KRAUSE, H., Kronprinzenufer, 15, Berlin, N. W., Germany.
1881. LABUS, CARLO, Piazza Castello 28, Milan, Italy.
1902. LERMOYEZ, MARCEL, 20 Rue de la Boetie, Paris, France.
1897. LUC, H., 54 Rue de Varenne, Paris, France.
1903. MCBRIDE, P., 16 Chester St., Edinburgh, Scotland.
1896. MACDONALD, GREVILLE, 85 Harley St., London W., England.
1894. MACINTYRE, JOHN, 179 Bath St., Glasgow, Scotland.
1892. MASSEI, F., 4 Piazza Municipio, Naples, Italy.
1887. MOURE, E. J., 25 Cours du Jardin-Public, Bordeaux, France.
1896. MYGIND, HOLGER, 31 Havnegade, Copenhagen, Denmark.
1901. NATIER, MARCEL, 12 rue Caumartin, Paris, France.
1903. ONODI, A., o' Uctza 12, Buda-Pesth, Hungary.
1894. SAJOUS, C. E., 2043 Walnut St., Philadelphia, Pa.
1901. SCHMIDT, MORITZ, Sachsenhausen, Schaumainkai, 15, Frankfort, Germany.
1896. SCHMIEGELOW, ERNEST, ix—2 Mariannengasse 3, Copenhagen, Denmark.
1881. SCHROETTER, LEOPOLD V., Schwartzenburg-Strasse 8, Vienna, Austria.

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1881. SEMON, SIR FELIX, 39 Wimpole St., Cavendish Square, London, England.
1902. THOMSON, ST. CLAIR, 28 Queen Anne St., Cavendish Square, London, England.
1903. TILLEY, HERBERT, 89 Harley St., Cavendish Square, London, England.
1901. WINGRAVE, WYATT, 11 Devonshire St., Portland Place, London, England.
1894. WOLFENDEN, R. NORRIS, Rougemont, Seaford, Sussex, England.

PAST MEMBERS.

Honorary Fellow.

*1883. Sir Morell Mackenzie, London, England.

Corresponding Fellows.

*1892. Lennox Browne, London, England.
*1887. A. Gouguenheim, Paris, France.
*1880. Wilhelm Meyer, Copenhagen, Denmark.
*1881. Pugin Thorton, London, England.
*1881. R. Voltolini, Breslau, Germany.
*1880. W. McNeil Whistler, London, England.

Active Fellows.

*1880. Harrison Allen, Philadelphia, Pa.
*1878. Morris J. Asch, New York.
1895. J. E. Boylan, Cincinnati, O.
*1883. C. W. Chamberlain, Hartford, Conn.
*1882. S. Hartwell Chapman, New Haven, Conn.
1884. S. Solis-Cohen, Philadelphia, Pa.
1880. E. W. Cushing, Boston, Mass.
1878. Ephraim Cutter, Boston, Mass.
*1880. W. H. Daly, Pittsburgh, Pa.
*1878. F. H. Davis, Chicago, Ill.
*1901. E. T. Dickerman, Chicago, Ill.
*1878. Frank Donaldson, Baltimore, Md.

*Deceased.

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1886. Frank Donaldson, Jr., Baltimore, Md.
*1879. J. H. Douglas, New York.
*1879. W. F. Duncan, New York.
*1878. Louis Elsberg, New York.
†1879. Edgar Holden, Newark, N. J.
*1882. Franklin H. Hooper, Boston, Mass.
*1878. Hosmer A. Johnson, Chicago, Ill.
*1879. Woolsey Johnson, New York.
*1880. William C. Jarvis, New York, N. Y.
1879. R. H. Kealhofer, St. Louis, Mo.
*1878. Rufus P. Lincoln, New York, N. Y.
1881. G. W. Major, Montreal, Canada.
1879. Charles McBurney, New York, N. Y.
1885. H. Clinton McSherry, Baltimore, Md.
*1881. E. C. Morgan, Washington, D. C.
*1886. J. C. Mulhall, St Louis, Mo.
1881. H. Mynter, Buffalo, N. Y.
*1895. J. E. H. Nichols, New York.
1879. H. K. C. Oliver, Boston, Mass
1894. William H. Park, New York, N. Y.
*1880. D. N. Rankin, Allegheny, Pa.
1881. J. M. Robertson, Detroit, Mich.
1878. Beverly Robinson, New York.
*1878. T. F. Rumbold, St. Louis, Mo.
†1880. Charles E. Sajous, Paris, France.
1879. Carl Seiler, Scranton, Pa.
1879. Andrew H. Smith, New York.
*1893. Charles M. Shields, Richmond, Va.
1879. Andrew H. Smith, New York.
1879. Bernhard Tauber, Cincinnati, O.
*1899. Max Thorner, Cincinnati, O.
1878. Clinton Wagner, New York, N. Y.
1896. Marshall R. Ward, Pittsburgh, Pa.
1879. Whitfield Ward, New York, N. Y.
*1886. Benjamin F. Westbrook, Brooklyn, N. Y.
1896. Greene V. Woollen, Indianapolis, Ind.

*Deceased. †Corresponding Fellow.

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PAST OFFICERS.

Presidents.

1879. Louis Elsberg.
1880. J. Solis-Cohen.
1881. F. I. Knight.
1882. G. M. Lefferts.
1883. F. H. Bosworth.
1884. E. L Shurly.
1885. Harrison Allen.
1886. E. Fletcher Ingals.
1887. R. P. Lincoln.
1888. E. C. Morgan.
1889. J. N. Mackenzie.
1890. W. C. Glasgow.
1891. S. W. Langmaid.
1892. M. J. Asch.
1893. D. B. Delavan.
1894. J. O. Roe.
1895. W. H. Daly.
1896. C. H. Knight.
1897. T. R. French.
1898. W. E. Casselberry.
1899. Samuel Johnston.
1900. H. L. Swain.
1901. J. W. Farlow.
1902. J. H. Bryan.
1903. J. H. Hartman.

Vice-Presidents.

1879. F. H. Davis.
1880. W. C. Glasgow, J. O. Roe.
1881. E. L. Shurly, W. Porter
1882. C. Seiler, E. F. Ingals.
1883. S. W. Langmaid, S. Johnston.
1884. J. H. Hartman, W. H. Daly.
1885. H. A. Johnson, G. W. Major.
1886. E. C. Morgan, J. N. Mackenzie.
1887. J. N. Mackenzie, S. W. Langmaid.
1888. W. C. Glasgow, C. E. Sajous.
1889. E. Holden, C. E. Bean.
1890. J. O. Roe, J. H. Hartman.
1891. M. J. Asch, S. Johnston.
1892. S. Johnston, J. C. Mulhall.
1893. J. C. Mulhall, W. E. Casselberry.
1894. C. C. Rice, S. H. Chapman.
1895. J. Wright, A. W. de Roaldes.
1896. T. M. Murray, D. N. Rankin.

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1897. A. W. MacCoy, H. S. Birkett.
1898. J. W. Farlow, F. W. Hinkel.
1899. T. A. De Blois, M. R. Brown.
1900. H. L. Wagner, A. A. Bliss.
1901. J. W. Gleitsman, D. Braden Kyle
1902. G. A. Leland, T. Melville Hardie.
1903. J. H. Lowman, W. Peyre Porcher.

Secretaries and Treasurers.

1879. G. M. Lefferts.
1882. D. B. Delavan.
1889. C. H. Knight.
1895. H. L. Swain.
1900. J. E. Newcomb.

Librarians.

1879. F. H. Bosworth.
1883. T. R. French.
1893. J. H. Bryan.

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